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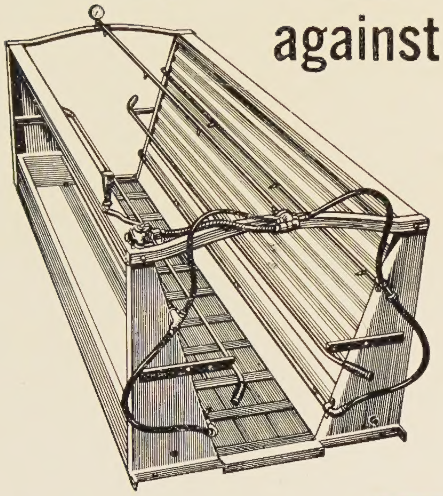

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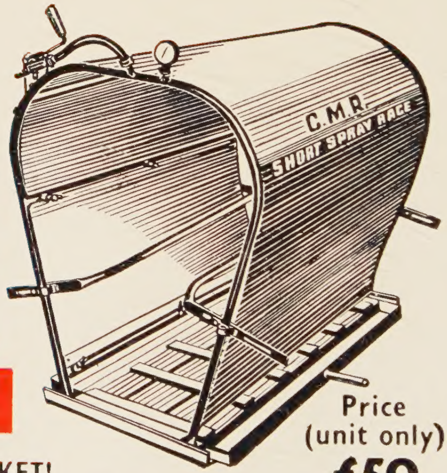

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CONTENTS

Pig Production on Farms Lags behind Advocated Standards	E. D. Edwards	106
Fruit Crop Estimates		112
Development of Southland Peat Soils	W. Faithful	113
Remoteness Will Go in South Westland but Still Limits to Farming Expansion	H. H. Tocker	119
Recent Research Work: Pasture Mixture Trials; Oversowing Tussock		120
Weed Identification and Control: Gorse	L. J. Matthews	121
Tussock Grassland Improvement on "Shenley"	H. A. Arthur	122
Care of Livestock during March		132
Pasture Production (Seasonal Notes)		133
Conservation of Farm Dairy Water Supply	M. H. Coppell	134
Bitter Pit in Apples	C. E. Woodhead	135
Importance of Minerals for Poultry	J. Edmondson	137
Radio Broadcasts for Farmers		139
Domestic Beekeeping	D. A. Briscoe	141
Lambing Estimates for 1958 Season		145
The Market for Wool	B. P. Philpott	147
The Home Garden	A. G. Kennelly	155
Meteorological Records for December		160
Hydatid Control Problems	M. A. Gemmell	161
Efficient Solid Fuel Hot Water System for Dairy Cleaning	G. R. Insull	166
History of Fruitgrowing in Nelson	N. J. Adamson	167
Pole Planting against Erosion	E. H. H. Kelman	176
The Home Orchard in Autumn	D. W. McCallum	177
Show Dates		180
Wintering Cows on Autumn-saved Pasture	L. R. Wallace	181
Dairy Produce Graded for Export		186
Combined Cappings, Comb, and Honey Melter	D. Roberts	187
The Flower Garden	J. P. Salinger and Rosalie A. Campion	191
Cheese for Tea	Maud B. Strain	200

Show day is awaited with mounting excitement by a host of town and country children, not the least of its pleasant prospects being a ride on the merry-go-round. Youngsters to whom supersonic flight is commonplace and an age of space travel just round the corner worship the bucketing merry-go-round horses of our cover this month no less than did earlier generations whose entertainments were fewer and simpler.

[D. R. Brenchley photo

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Survey Evidence:

Pig Production on Farms Lags behind Advocated Standards

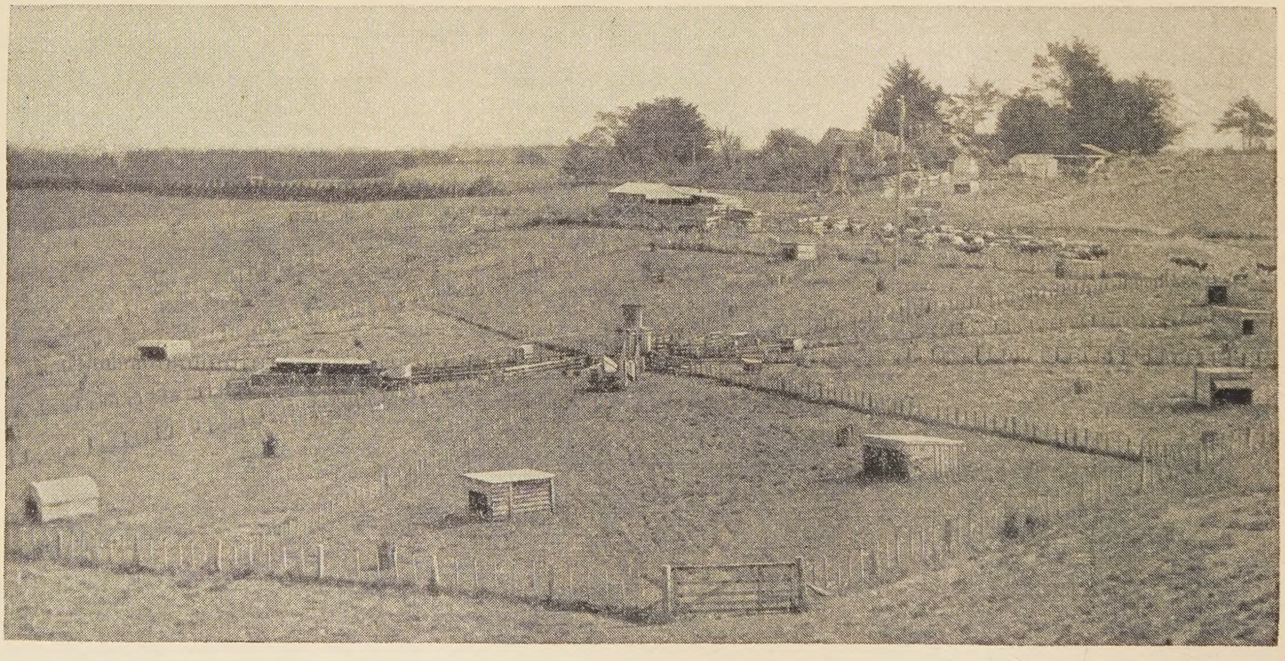
SCHEMES begun 30 years ago to raise the standard of pig keeping have not provided the impetus that was envisaged. This is borne out by a survey undertaken by the author of this article in 1957. Lack of progress is attributed mainly to:

- Failure of farmers to adopt the advocated measures. There has been no great incentive to do this.
- Failure of advisory services to disseminate information successfully or to understand difficulties or limitations to the application of recommendations on individual farms.
- Disinterest of many dairy farmers in pigs; they remain a sideline, though still yield the most profitable return at present available from the dairy by-product.
- Lack of a premium for quality carcasses which would be an inducement to provide better conditions and management.

The survey revealed that farmers who have been very successful with pigs consider the advice offered them sound. This suggests that more farmers should investigate the extension facilities available to them and profit from improvements in management which are providing better returns and working conditions for practical farmers who have adopted them already.

By E. D. EDWARDS,
Research Officer,
Department of Agriculture,
Wellington

THE establishment in 1929 of the Waikato and Manawatu Pig Recording Associations marked the beginning of a campaign to establish standards for pig production on dairy farms, to create an interest in pigs, and eventually to provide an advisory service that would encourage farmers to use sound and profitable methods. The advisory service has steadily expanded over the years and has been able to offer advice based on the work of research teams in New Zealand. To obtain a measure of the methods employed today and of the effectiveness of the advisory services a survey of the suppliers of certain butter and cheese factories was carried out in 1957.



Dairy farmers are not adopting more efficient methods of pig production mainly because pigs are only a sideline business to an occupation which calls for rather heavy capital investment and efficient use of labour. Conveniently arranged piggeries of the type shown may not be the most efficient, but they represent a practical approach to the problem of keeping pigs on the dairy farm.

Key Points in Management

Before survey results are dealt with points in management which have been advocated as a sound basis for profitable pig production require brief mention. They are:

1. Home breeding of pigs required for fattening.
2. Selection of a prolific strain of breeding stock.
3. Spreading farrowings over the 6 weeks ahead of calving of the dairy herd and aiming to maintain regular 6-monthly intervals for all sows.
4. Early weaning of litters in winter or spring, a recent development, to permit earlier summer farrowings and increased efficiency in use of food.
5. Feeding the sow well at all times to ensure regularity in breeding, birth of strong, even litters, and a plentiful supply of milk for piglets.
6. Creep feeding suckers away from the sow on dry meal or pellets from 2 to 3 weeks of age.
7. Continuing the feeding of meal to pigs, at least until they are safely weaned.
8. Achieving good carcass quality by feeding pigs ad lib. up to pork weight; thereafter on a restricted ration with a limit of 6 food units for heavy baconers.
9. Using the Ruakura round house plan and a heat lamp in farrowing houses to reduce losses after the birth of the litter.
10. Promoting efficient conversion of food by providing housing in which temperature and ventilation are controlled, especially about sleeping quarters.

Farms in Survey

The survey was based on factory-supply areas considered to be representative of the main pig-producing districts in the North Island. The factories were:

Butter: Mauriceville Cooperative Dairy Company and Cambridge Cooperative Dairy Company.

Cheese: Alton Cooperative Dairy Company, Taranaki; Kakaramea Cooperative Dairy Company, Taranaki; and New Zealand Cooperative Dairy Company's factories at Matamata, Otaua, and Rukuhia.

There were 503 farms supplying the butter factories and 215 farms supplying the cheese factories, but except at Cambridge most farms did not have pigs. Of the farms without pigs those at Mauriceville were mainly "billy-can" suppliers with small farms or sheep farmers with a few cows, and those in the whey districts did not collect their whey. Study of pig production methods was therefore possible on only 328 of the 718 farms.

Details of farm area, stage of development, and labour supply were collected, since these factors, individually or collectively, will have some effect on the methods employed.

The farms round Cambridge and in the Taranaki group were more highly developed and generally much smaller than those in other districts, the average areas being 125 acres at Cambridge, 109 acres in Taranaki, 206 acres at Mauriceville, and 173 acres on Waikato whey farms. There were sharemilkers on about a third of the farms in the whey-supply groups, but the proportion of sharemilkers was lower on farms where pigs were fed skim milk.

The typical farm in this survey in Taranaki had 70 cows and 1.8 labour units; in the Waikato whey group 90 cows and 2.2 labour units. Farms at Cambridge feeding skim milk had 59 cows with 1.5 labour units, whereas at Mauriceville there were 40 cows and 1.5 labour units, reflecting the preponderance of mixed farming.

Home Breeding as a Policy

About 20 per cent of Mauriceville farms and 10 per cent of Cambridge farms with pigs did not have sows, but

Pig producers, by a levy on pigs killed and from taxation, provide an advisory service on pigs, but many more farmers should take advantage of the advice available on all aspects of pig production. Here a pig council supervisor is discussing creep-feeding methods with a farmer.

[*Sparrow*

in whey districts all farmers keep sows. However, many farms with sows, especially those with a wider than average ratio of sows to cows, purchased pigs for fattening. At least 20 per cent of the farmers feeding skim milk bought pigs, about 15 per farm. In Taranaki an even greater proportion of farmers purchased pigs (to the extent of 32 per farm). The Waikato farmers feeding whey rarely buy, as they stock quite heavily with sows and cater mainly for the weaner and store trade.

Most farmers with pigs have not more than 5 sows. On skim milk farms one sow is run to every 12 or 13 cows, in the Taranaki group 1 to 22 cows, and in the Waikato whey group 1 to 9 cows. Where more than 5 sows are kept the ratio tends to become closer.

Some of the reasons why farmers prefer to buy part or all of their requirements are:

It is difficult to rear pigs successfully on some soil types in some localities.

It is not easy always to have on hand sufficient pigs of the right size to cope with the milk or whey available,

On small piggeries, keeping or getting the services of a boar is a problem; many of these units are uneconomic, having high overhead costs.

Though these reasons may justify the purchase of pigs, better management all round, by reducing losses, would undoubtedly reduce the need to buy pigs. Losses often result from disease introduced with bought pigs.

Selection of Breeding Stock

It was not possible to obtain information on the prolificacy of sows. However, data on the breed of boar used proved interesting in that one out of every 10 boars was a crossbred. They were used more extensively on farms at Mauriceville and in the Waikato whey group, largely on farms with 4 to 5 sows, but ranging up to 36 sows. Almost every breed available was represented in these boars, but they were chiefly Berkshire cross.

Berkshire purebreds accounted for 41 per cent of all boars, Tamworth for 18 per cent, and Large White for 15 per cent. Tamworths were very popular in Taranaki.

Mating purebred boars with first-cross sows normally would ensure satisfactory prolificacy, but the actual level is also affected by the strain of stock and the care they receive. Breed, therefore, is not all important, though Large Whites are generally superior in prolificacy.

Breeding in relation to type of trade catered for was also considered, since the breeds can be classified as producing good porker or good baconer carcasses. In New Zealand dual-purpose breeding stock are generally necessary because both porkers and baconers have to be produced to fit in with the seasonal food supply. Thus in the survey Berkshire boars were equally popular as sires whether unfinished pigs, porkers, or baconers were the chief product. Tamworths were used mainly for baconer production and Large Whites for porker production. Crossbred boars, Large Blacks, and Duroc Jerseys were used mainly for the weaner and store pig trade. Obviously, producers who sell weaners and stores are much less interested in carcass quality than in the number of pigs they can wean per sow and how quickly they grow.

Farrowing Policy

Insufficient information was obtained on farrowing programmes to give a reliable indication of the months and frequency of farrowing. A continuous record for the year is necessary, but few farmers could supply this. Most farmers stated that they aimed at two litters per sow each year and favoured certain periods, but from tallies of pigs sold per sow during the year not many appeared to achieve their objective.

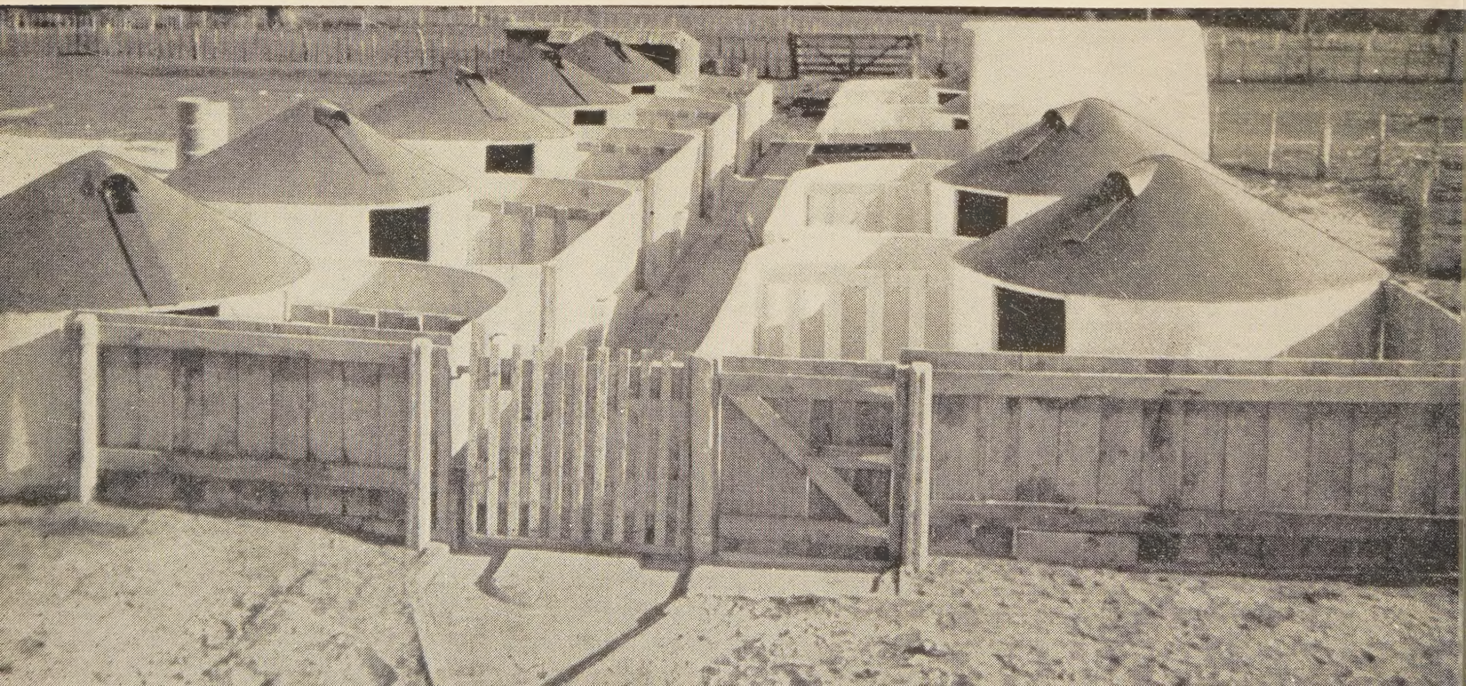
Other surveys have shown that farrowings are well spread. This was confirmed to some extent in this survey by the data obtained on store pigs. Nearly 60 per cent of the farmers round Cambridge wintered stores, with an average of 22 per farm. At Mauriceville 40 per cent wintered stores, having about 14 per farm. Two-thirds of the whey farms carried stores, with about 36 per farm.

The farrowing policy recommended at the beginning of this article has as its aim the most efficient utilisation of the dairy by-product. With an appropriate balance of sows to cows and the use of some meal supplement, wintering of many stores should not be necessary, particularly on skim milk farms.

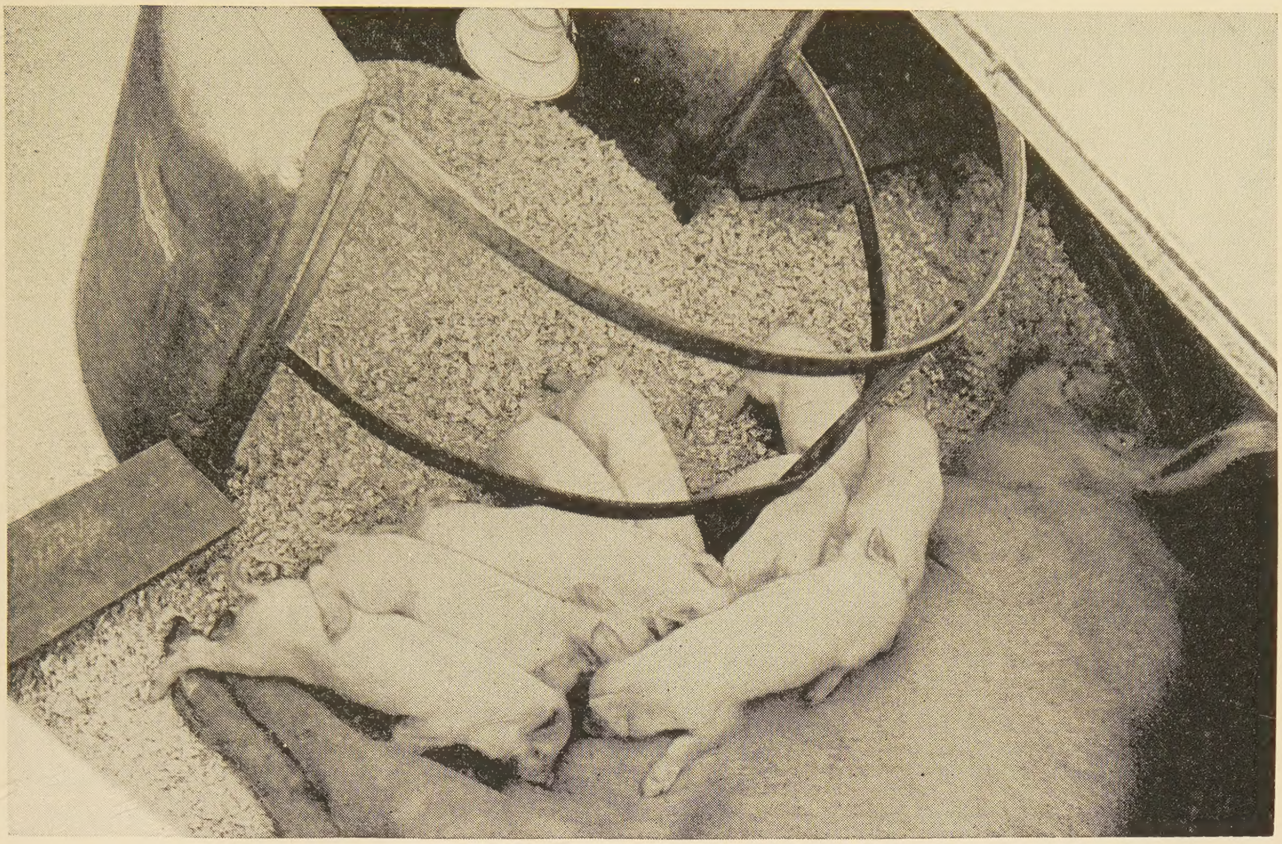
This survey indicates that this ideal is not often achieved on farms; indeed, it may not pay sometimes where there is a profitable market in spring for stores. However, a farrowing policy which largely obviates the carryover of pigs in store condition is sound. Failure to carry it out seems to be due to inadequate care of sows, resulting in waste of the sows' breeding potential through failure of some sows to get in pig when they should.

Early Weaning of Pigs

The early weaning of pigs, as recommended in recent years, should appeal as a method of getting two litters per sow away each year before the supply of milk or whey fails. It permits more efficient use of available food and should limit wide fluctuations in con-



This piggery based on the round farrowing house design and built by plastering on an expanded metal frame was comparatively cheap to construct and is easy to work, but the houses become excessively hot in summer. This lack of insulation must affect the pigs' health and could prove expensive in the long run.



A heat lamp, safety zone, farrowing rail, litter boards, and bedding of wood shavings are featured in this view of a round farrowing house. All assist in reducing losses in piglets to a minimum.

dition of sows, a factor contributing to the breeding troubles just mentioned.

The survey showed that only 2 per cent of farmers early weaned pigs at from 2 to 4 weeks of age. The average for all farms was about 7 weeks of age. Farmers tended to wean a little earlier with spring litters to advance the second litter, which, however, may not be weaned until 8 or even 10 weeks have elapsed. There is thus an attempt to plan farrowings, but few are prepared to go to the extent of weaning at an early age, probably because early weaning requires a higher standard of management and cleanliness than farmers are prepared to give to pigs.

In these circumstances efficiency gives way to the most practical and profitable method, as it is better to have 8 live pigs reared naturally than 8 pigs which died in the process of hand rearing. Early weaning mixtures in meal or pellet form are being continually improved, however, so that there is every prospect of success for the farmer who is prepared to give the method a fair trial.

Sow Management

The productivity of sows is largely determined by the way they are fed and managed. This is particularly so after weaning, as it influences the regularity of breeding, but it applies right from the time the gilt is selected for breeding. Feeding to maintain good breeding condition in the sow and rationing food according to the size of litter being suckled are important.

In this aspect of husbandry the survey revealed a distinct variation between districts and a generally poor standard of management. About 28 per cent of skim milk farmers, 5 per cent of the Waikato whey group, and 48 per cent of the Taranaki whey group appeared to follow recommended practice. This suggests that the advisory service is more effective in some areas than others. The standard of management for Taranaki was not high and should be attainable elsewhere.

Creep Feeding

Only 47 per cent of all farmers fed meal in a creep to suckers, and one-third of the farmers who used meal did not feed any in a creep. No measure of the effectiveness of creep feeding on individual farms was obtained; and on many not much advantage may be gained from it because of unsatisfactory conditions.

Meal fed in the creep is probably used more economically than that fed at any other stage in the growth of the pig. It promotes rapid growth and lessens the shock of weaning and should be standard practice on all home-breeding farms. Creep feeding was most widely used in Taranaki and least in the Waikato whey group. One reason why the practice is not more widely adopted is the reluctance of many farmers to spend money on meal when milk or whey is available. With farrowings well spread the necessity for creep feeding would not be very great. In any case the litter would have access to their mother's trough and so to meal if she received any, but the intake of meal by this means would be very small.

Feeding Meal to Weaners

Apart from the first day or so after birth, weaning is the most critical stage in the life of the pig. This is the stage when it should receive a well balanced diet appropriate to its capacity, but often it is underfed or overfed, according to the season, on a dairy by-product.

A cosy weaner coop as shown, coupled with sound feeding, assists weaners to overcome the shock of weaning with very little setback in growth.

If weaners are creep fed, the shock of weaning is reduced, but it is always wise to carry on feeding meal for a few weeks until the pigs are safely through this stage. As a result of the better growth the pigs are more able to cope with the flush of milk or whey in spring, and in autumn are more likely to be marketable before these supplies fail.

The survey revealed that only 39 per cent of all farmers gave meal to weaners. Since about a quarter of the farmers fed no meal, it is advisable to consider only those who used it to see how weaners were treated.

On the skim milk farms about 45 per cent gave meal to weaners, whereas on the whey farms roughly 90 per cent did so. There is some appreciation on whey farms of the need to supplement whey with a meal, especially for weaners. The overall impression remains, however, that farmers prefer not to spend money on meal for the weaning period. It is more likely to be spent on meal to tide pigs over winter, judging from survey data on the feeding of store pigs.

Amount of Meal Used

Disregarding the fact that efficiency between farms varies tremendously, it is interesting to note the average amount of meal fed per sow by farmers who used meal. In all groups except Taranaki this amounted to about 3½ cwt. per sow. In Taranaki an average of 13½ cwt. per sow was used.

For skim milk farms 3½ cwt. per sow is not a heavy rate and under really good conditions three times this amount could be used. However, it must represent the limit which farmers are prepared to go to in practice when much of the meal is used in the wintering of store pigs. As a group the Taranaki farmers used meal in optimum amounts for efficient production and the survey shows they have reached a reasonably good standard of management.

Restricting Rations of Baconers

If pigs being fattened for bacon (especially shorter, pork-type pigs) are fully fed up to slaughter, the carcasses may be too fat to produce bacon that sells readily to the public. In recent years a weight limit has been set in schedules to reduce the number of overfat pigs sold for slaughter and this has been quite effective. However, the problem can be overcome by controlling feeding once porker weight has been reached.

Of the farmers using skim milk 29 per cent in the Waikato and 13 per cent in the Wairarapa restricted rations to baconers to not more than 6 food units per day. The corresponding figures for Taranaki and Waikato whey farms were 17 per cent and none respectively. Only 6 farmers in the Waikato feeding whey sold baconers.

In the Wairarapa 33 per cent of the farmers indicated that the supply of milk available limited the amount which could be given to baconers and thus there was little danger of overfeeding.

Only a small proportion of farmers in the survey, therefore, restrict the rations of their baconers. It can be shown also that a large proportion of the baconers sold consists of pigs which have been wintered. Wintered pigs tend to be underfed and if in spring they are overfed to cope with the flush of milk or whey, the stage is set for the production of overfat baconers.

Unless a stiff penalty on overfat pigs is introduced, it seems that most farmers will continue to feed their baconers to appetite.

Farrowing Accommodation

Information was obtained on the number and type of housing units and whether or not heat lamps were used for farrowing. Of particular interest was the extent to which the round farrowing house or its basic principles of design had been adopted. About 4 per cent of farms used them and these were confined to the skim milk groups in the Waikato and Wairarapa. Three per cent of farmers used heat lamps. Some of the farmers with round houses thus used no supplementary heat.

Despite the proven value of the round farrowing house at research centres in reducing losses from overlying, the house has not yet been "sold" to farmers. Admittedly the design and materials for construction of some of the early commercially produced types were not satisfactory. These aspects are still being improved and types are now in use which farmers find very suitable.

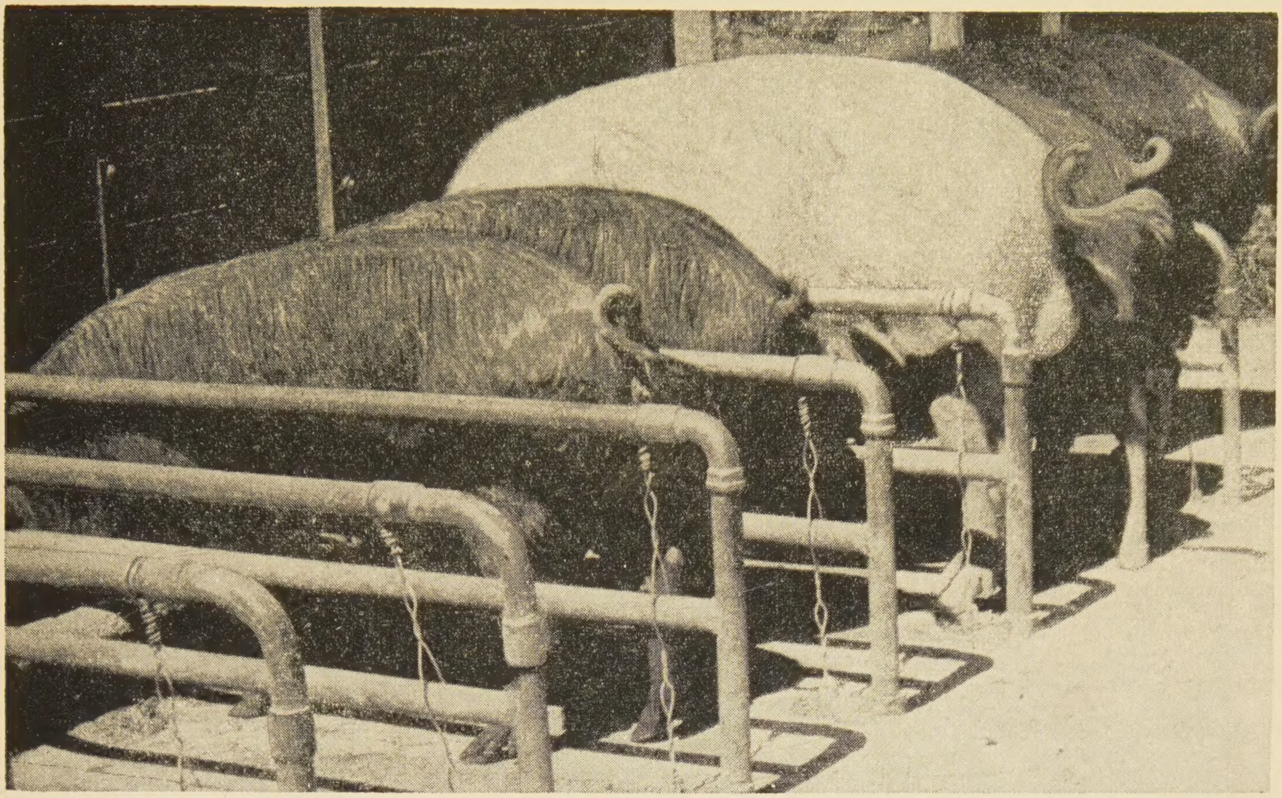
Further evidence that the round house design is not being fully implemented when houses on this ground plan are erected by farmers is provided by survey data on heat lamps. The design requires the central safety zone to be warmer than the rest of the house, especially for a short period after the birth of the litter. This necessary supplementary heat is not being provided by some farmers.

The heat lamp can be used in orthodox houses on the same basis, but this survey shows that farmers have not yet developed interest in these new ideas on saving pigs' lives.

Fattening Accommodation

The importance of providing housing which will promote health and economical conversion of food by fattening pigs has long been emphasised. The more the environment can be controlled about certain optimum levels for its components the more efficient will be the fattening process.

In practice the farmer is concerned with keeping air temperature and ventilation within reasonable limits where the pigs sleep. In the survey no attempt was made to obtain details of dimensions or materials, but the types of all houses on the piggeries have been classified as being fully



Feeding bails enable individual sows and the boar to get their proper share of food to keep them in good breeding condition.

enclosed, having enclosed sleeping quarters, houses with the front open, or round farrowing houses.

Obviously this can only be a rough measure of the suitability of houses and includes those used by dry breeding stock. It was found that two-thirds of all units had open fronts, except the Waikato whey group, in which 84 per cent were of this type, and here pigs are sold mainly as weaners or stores. The remaining units were almost entirely the types with enclosed sleeping quarters, except in Taranaki and Wairarapa, where 4 and 7 per cent respectively were fully enclosed.

The fully enclosed units are almost all multi-unit buildings and indicate a trend in type of layout and a need to counter climatic conditions.

The large proportion of houses with open fronts indicates poor control over environment unless good bedding is provided.

Pigmeat Production Levels

Information on the effect of management and housing on pigmeat output was obtained from only 95 farms. It was analysed to show the management associated with high and low levels of production. The results are shown in the table below.

Aspects such as the individual skill of the farmer, farrowing programme, and strain of stock may have had a considerable effect on production, but could not be taken into account.

High-producing farms have almost twice the meat output of low-producing farms, selling 4.6 pigs more per sow. On high-producing skim milk farms sow management is much better, more meal is used, and more suckers and weaners receive meal than on low-producing farms.

On whey farms the most notable contribution to high production seems to be the use of nearly double the amount of meal fed on low-producing farms.

Even on the above-average farms in this sample there is still much scope for better husbandry, particularly in sow and litter management.

MAJOR DIFFERENCES IN MANAGEMENT ASSOCIATED WITH HIGH AND LOW LEVELS OF PRODUCTION ON SKIM MILK AND WHEY FARMS

Farms	Pigmeat production per 100 lb. butterfat			Pigs sold per sow	Per cent of farms with good sow management	Use of meal				Per cent of farmers who crop	Per cent of farmers who winter stores
						Per cent of farmers			Amount per sow cwt.		
	Level lb.	Average lb.	Per sow lb.			Using meal	Feeding meal in creep	Feeding meal to weaners			
Skim:											
29	Over 34	42	1,242	14.7	63	83	65	42	4.1	34	52
35	Under 34	25	708	10.1	21	77	37	28	2.5	28	60
Whey:											
17	Over 16	22	1,084	12.0	38	82	59	93	9.2	47	76
14	Under 16	12	622	7.4	31	85	69	70	5.0	35	83

PIG PRODUCTION . . .

Farmers' Views on Advisory Service

The survey revealed that less than a fifth of all the farmers had been in touch with their local district pig council supervisor, though in the Taranaki group about three-quarters had.

The other principal source of advice is "The New Zealand Journal of Agriculture", which is purchased by nearly half of the farmers in every district except those on skim milk at Cambridge, where only 27 per cent subscribe. It is estimated that a quarter of the farmers getting the "Journal" make no attempt to apply the advice on pig husbandry.

There is reason to believe from the survey that a large proportion of the farmers do not know that the Pig Producers' Council advisory service exists, or that it is supported by a levy on pigs sold for slaughter. Obviously the whole advisory service is not making very effective contact with farmers.

To throw some light on the reasons for this situation the opinions of the farmers were sought. Only 41 farmers were prepared to comment, but half of these were dissatisfied with the approach of advisory officers to individual farm problems. They felt that the advice should be more practical and economical to implement. However, a third of the farmers who gave opinions were very satisfied and thought the service should be publicised more.

Farmers' Views on Pig Industry

Many more farmers showed interest in industry affairs generally, possibly because this had a direct bearing on the returns they received. In the Waikato area about 45 per cent offered opinions on industry affairs, in Wairarapa 25 per cent, and in Taranaki 83 per cent, a total of 136 farmers.

Marketing aspects were by far the most important. One-quarter of the farmers wanted an effective grading scheme, because they objected to producing good carcasses and receiving the same price as those who were apathetic about quality.

The next most important aspect was the retail price of pigmeat. Farmers considered that the margin between farm and shop price was too great. The farmer's share of the value of his product does appear to have diminished in recent years.

Conclusions

It is apparent that methods which have been advocated as a sound basis of pig production are not widely used. The advisory service is partly responsible in that it has not disseminated advice successfully and some recommendations do not recognise the problems which confront individual farmers.

The main reason for lack of progress, however, is that pigs are only a sideline to an occupation which calls for rather heavy capital investment and efficient use of labour. There has been no great incentive to improve methods of pig production.

Consequently many suppliers of factories do not bother with pigs or, if they do, tend to understock with sows because of difficulties in maintaining a regular cycle of reproduction tuned to the flow of milk or whey. When the breeding programme gets out of gear pigs may have to be purchased and meal bought to keep pigs alive when food is short.

If a crossbred boar will get the sows in pig, there is no object in purchasing a purebred animal similar to one which has failed in the past, especially when there is no worthwhile premium for quality.

The enthusiast generally is very successful with pigs and considers advice given to be sound as a basis for planning his business, but he often improves or modifies the ideas in their application to his conditions to get best results.

The man who has little interest is not concerned with efficiency when there is no incentive in the market or regulations which demand it. He, therefore, shapes his methods accordingly. This means, by and large, that he is still using the pig primarily as the least troublesome channel for disposal of the dairy by-product which would otherwise be a nuisance—until he can get on tanker supply to the factory.

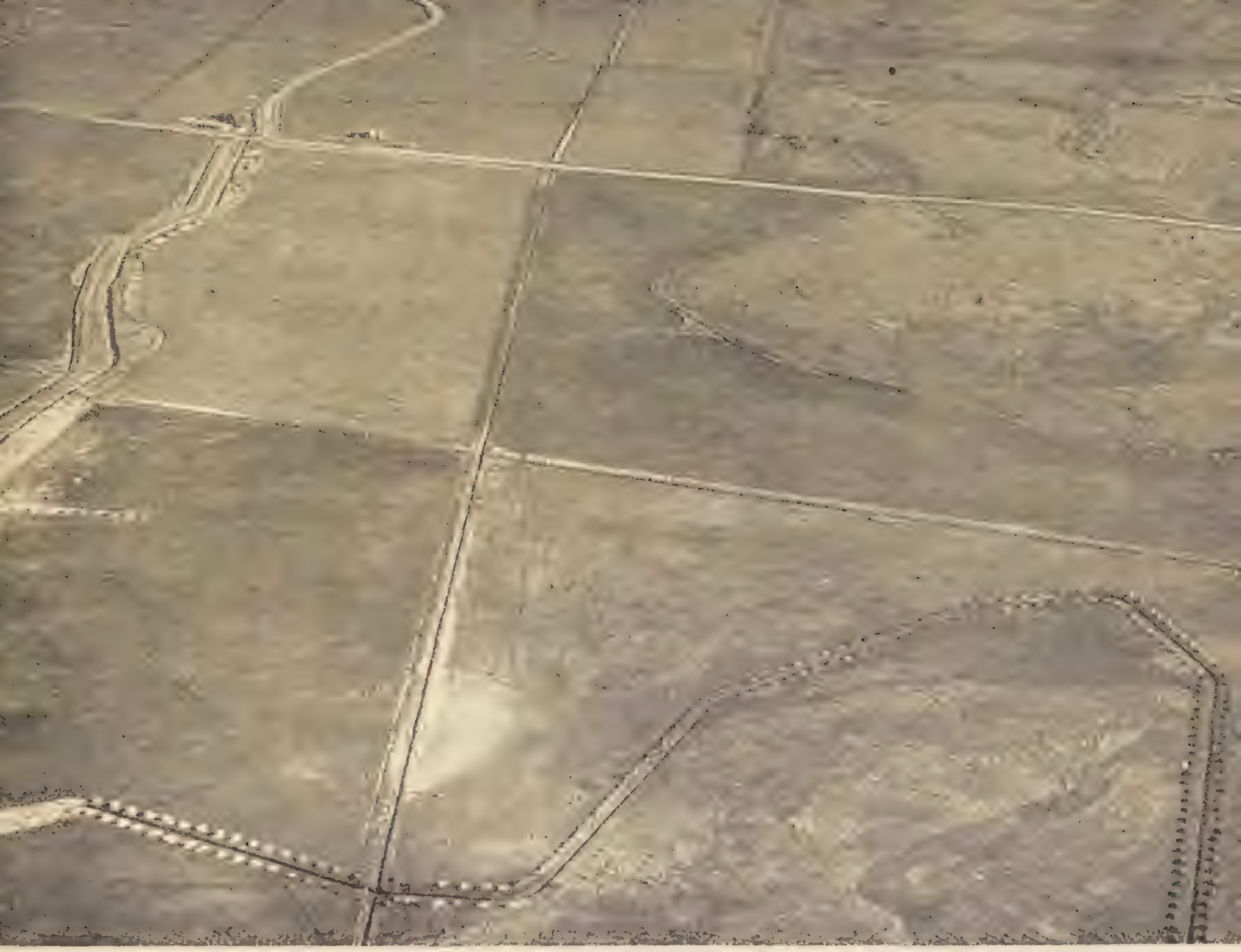
The farmer who has been prepared to go further than this, take a real interest in the management of his pigs, and give them conditions in which they can produce efficiently knows that the returns he can get through pigs—with less unpleasant work than many who "just keep pigs"—are much better than can be obtained from the disposal of the by-product for existing alternative methods of processing. He cannot, unfortunately, always hold out against the decision of his dairy company to process the by-product for sale.

As our pig production is overtaken by the demand for pigmeat on the local market the keen pig producers may be encouraged by a better return for the produce to re-enter the pig production field on a different food supply, specialising in this line.

Fruit Crop Estimates for 1958-59 Season

THE following estimates made in December of the fruit crop for the 1958-59 season are in 000's of bushel cases. They are summarised from information supplied by field officers of the Horticulture Division of the Department of Agriculture. Districts producing less than 500 bushels of a variety are not shown, but are included in totals. District totals of more than 500 are rounded to the nearest 1,000.

FRUIT	DISTRICT								
	Auckland Province except Gisborne	Gisborne	Hawke's Bay	Wellington and Taranaki Provinces	Nelson Province	Marlborough	Canterbury and Otago except Central Otago	Central Otago	Total 000 bushels
APPLES—									
Ballarat	57	6	85	2	10	8	9	1	178
Cox's Orange Pippin ..	9	1	60	3	140	11	15	15	254
Delicious	18	5	89	3	228	31	23	49	446
Dougherty	14	4	68	—	34	2	—	—	122
Granny Smith	135	6	150	8	112	3	3	5	422
Gravenstein	24	—	37	—	85	2	1	2	151
Jonathan	9	—	50	2	305	34	18	21	439
Sturmer	8	5	240	21	428	36	69	37	844
Others	97	6	171	8	212	19	56	42	611
Total	371	33	950	47	1,554	146	194	172	3,467
PEARS—									
Beurre Bosc	6	—	3	—	11	—	—	—	20
Louise Bonne de Jersey	2	—	25	—	1	—	—	1	29
Packham's Triumph ..	15	—	10	—	12	—	—	—	37
P. Barry	12	1	17	1	6	—	2	—	39
W. B. Chretien.. ..	19	1	90	—	70	1	6	12	199
Winter Cole	2	1	75	1	61	1	8	7	156
Winter Nelis	1	1	53	—	15	1	2	14	87
Others	33	—	8	1	17	1	9	6	75
Total	90	4	281	3	193	4	27	40	642
OTHER FRUITS—									
Peaches	101	17	420	1	47	8	9	87	690
Apricots	2	2	9	—	1	—	19	119	152
Nectarines	2	2	17	—	2	1	2	14	40
Plums	59	5	82	1	10	2	12	20	191
Cherries	—	—	1	—	—	3	2	10	16
Quinces	7	1	7	1	3	—	1	—	20
Total	171	27	536	3	63	14	45	250	1,109



[Hewett Aviation

Part of the grid drainage system. The first 100 acres grassed is at the top left of the photograph.

Development of Southland Peat Soils

By W. FAITHFUL,

Instructor in Agriculture, Department of Agriculture, Invercargill

THERE are numerous comparatively small areas of peat throughout Southland, most of these being in the western portion of the land district. There are also numerous peaty soil associations in the bush lands in the south-eastern and western districts. These peat-like soils also occur in the scattered bush localities in and near the Hokonui hills. The most extensive peat area occurs in what is known locally as the "Seaward Moss", which is south-east of Invercargill and is estimated to cover from 60,000 to 80,000 acres. The reason for the wide range in the estimate of acreage is that the peat is not in one continuous area, and in effect it may be broadly divided into three types of "soil".

THE first type, which covers the smallest area, is a very wet clay soil on which grows some manuka associated with red tussock, rushes, moss, and some *Phormium tenax*. This soil type is found in patches throughout the peat area and along the margins of the peat blocks; it merges into the second soil type, a more pronounced peat complex, which is resting on a white marine gravel. The depth of this peat is between 3 to 6 ft. and the vegetative cover is mostly moss and some manuka. The third soil type is a very raw waterlogged peat up to 15 to 16 ft. deep and in places carrying moss, stunted scrub, and some manuka.

A number of streams run through this area of peat land, some of which have been given attention at various

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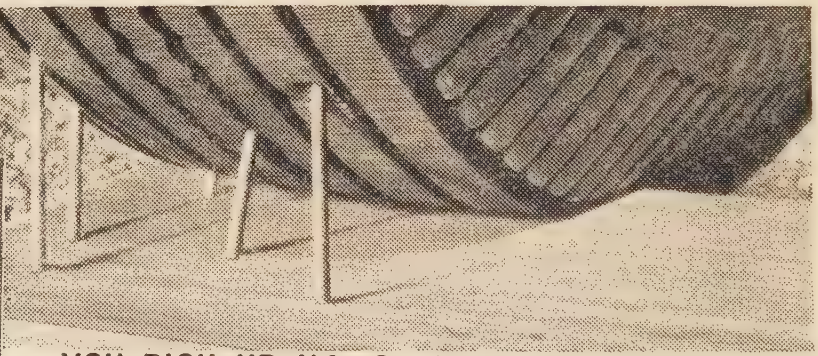

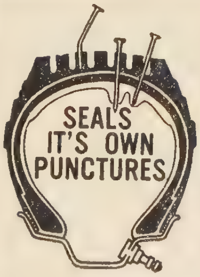

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times by the Southland Catchment Board, but much out-fall drainage is required before the area can be considered adequately drained for full development.

Development Work

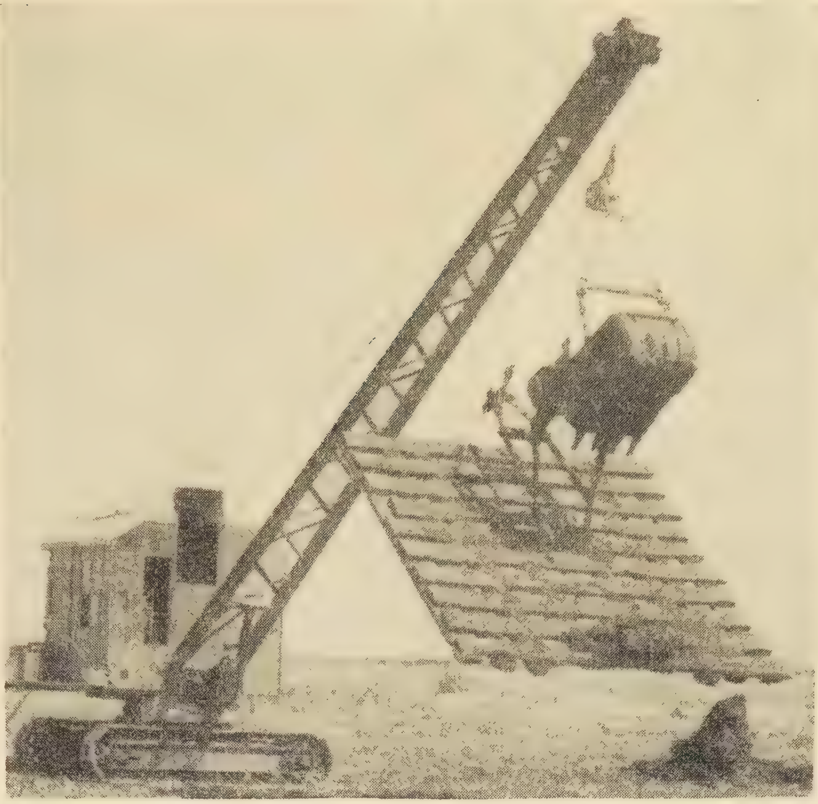
Development of this peat land has been spasmodic over a long period, and has been more or less confined to the very wet clay and the shallower peat-like soils, the technique adopted being the usual Southland land development programme of deep ploughing in of the red tussock and scrub after the necessary drainage has been completed. Turnips or swedes are usually ridged in and a second consecutive crop may be taken. In the third season the area is sown out in a pasture mixture. During the development period lime is applied, quantities varying from 1 to 3 tons per acre according to the financial and other circumstances of the farmer concerned. Reverted superphosphate is used at the time of sowing turnip crops and in grassing.

The most serious attempt at any very extensive development has been that of the Department of Lands and Survey on a 3,000-acre block on which each of the three major peat soils described earlier is found. Preliminary major drainage to furnish out-fall for this area had been provided by the Catchment Board on three major creeks which intersected the property. With this work completed the actual development of the block began with the installation by the Department of Lands and Survey of channelling, a grid system, and main drains. These drains were of course placed in the most advantageous positions to permit rapid lowering of the water table.

Use of Mats for Excavator

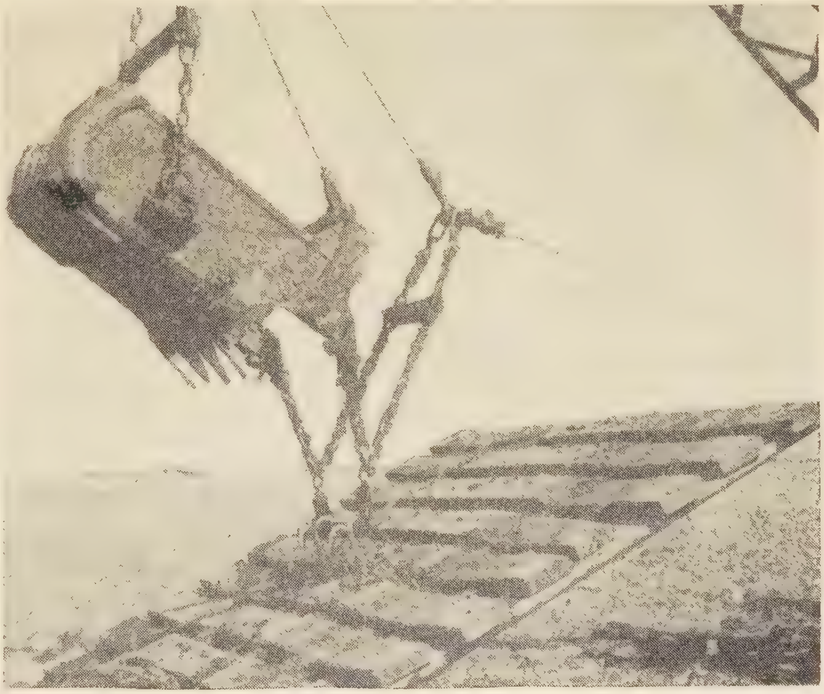
Owing to the very wet and spongy conditions it was necessary to use mats to carry the excavator while the drainage channels were being installed. Usually the use of mats necessitates additional labour for moving the mats, which of course have to be laid ahead of the excavator. During the first 12 months of drainage work on this peat development area there was great difficulty in keeping men on the job for moving mats, as it is very irksome work with much time being spent standing around, often under cold, wet conditions.

The contractor at Waituna overcame this difficulty by a rather ingenious addition to the mats. Two double hooks were attached to the centre of each, and a short length of chain was added to the two bucket chains, these short lengths of chain being linked by a steel bar. When a mat had to be moved the steel bar was caught under the hooks and the mat was lifted and placed ahead of the excavator. The mat could then be edged exactly into position without being handled in any



Swinging a mat into position.

▼ The double hooks on a mat with the bar added to the bucket chains to facilitate shifting of mats.



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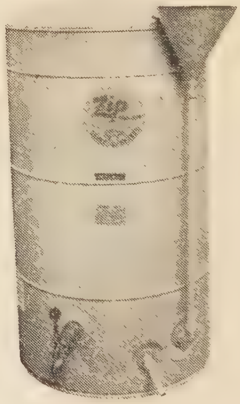

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way other than mechanically. For transportation of the mats the hooks could be released and lowered into the decks of the mats so that the mats could be stacked evenly on the transporter.

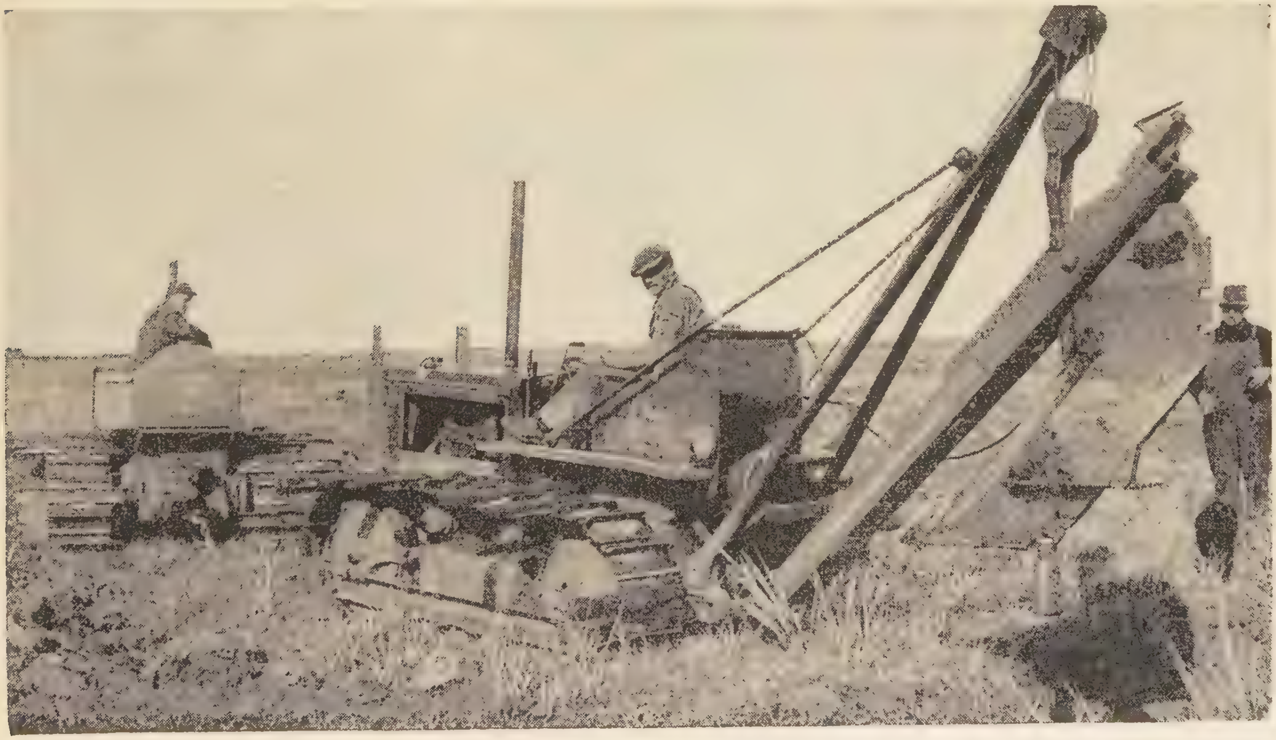
This method enabled the mats to be moved and placed in position much more quickly than was possible by the old method, and it is estimated that in one year it saved more than £1,000 in wages.

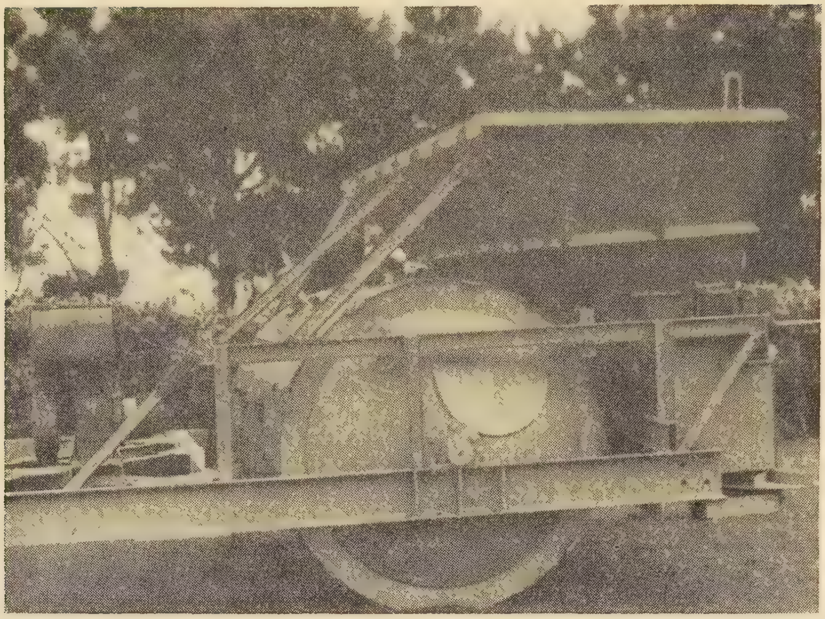
The first attempt at cultivation by orthodox methods was most unsatisfactory, and it was decided to dispense with any ploughing and concentrate on surface cultivation and consolidation of the peat. The technique has been to use a specially reinforced, heavy, 6 ft.-wide rotary hoe in conjunction with a crawler tractor of about 5 to 6 tons with tracks extended to 30 in. The rotary hoe cuts up the surface cover of moss and scrub as soon as the ground is dry enough to carry the crawler tractor. (This dryness of the ground is comparative, because the tractor is frequently operated with the tracks almost under water.)

Much of this peat land has a great quantity of timber in it, and this of course is a serious hindrance to drain-

This drain, made with a dragline, → was 110 chains long in a straight line.

🡻 A specially mounted and specially designed mole plough is used, and frequently two tractors are linked to pull it.





The specially constructed roller and lime and fertiliser sower, which weighs 8 tons when loaded. Water may be added to increase the weight, but it was not required.

age and land development. After some months of trial and error it was found that a heavy winch-operated mole plough which was specially designed to bring this timber to the surface was very good in assisting drainage and drying out of the peat. This mole plough has a 5 in. plug and is used sometimes before the first rotary hoeing and thereafter at any time when it could be expected to do any useful work. In practice best results were secured from mole drainage in spring (October).

Fertilisers and Seeds

After the first hoeing the broken-up mossy growth and scrubby vegetation is left to dry out until it will carry a fire, when it is burnt, preferably on a windy day. After this burning a further hoeing is usually necessary and there may be another burn. After this the area is rolled and 2 tons of lime are applied. The rolling and the lime application are done in one operation by a specially constructed roller, about 6 ft. in diameter, in which is incorporated a bulk lime sower which can carry up to 4 tons of carbonate of lime. During the last two seasons the lime has been put on by aeroplane. The cost of this method is about the same per acre as that of ground application, but the benefit of the extra consolidation is lost. Superphosphate and grass seed have also been applied from the air.

Seed Mixtures

A standard grass-seed mixture of 10 parts of perennial ryegrass, 10 parts of short-rotation ryegrass, 5 parts of cocksfoot, 4 parts of dogstail, 2 parts of timothy, 2 parts of red clover, and 2 parts of white clover is sown at about 25 lb. per acre with 3 cwt. of superphosphate, the grass seed being usually sown by a grass-seed box on the Cambridge roller.

Analysis of this peat undertaken at various times indicates a pH varying from 4.2 to 4.8 and a very low calcium and phosphate status and a medium potash status. Owing to the low fertility of this virgin peat young pasture once established must be fed. A further application of 1 ton of lime is made during the first year in pasture and is usually followed by a further ton during the next season. All new pastures are topdressed with a mixture of 2 cwt. of superphosphate, ½ cwt. of potash, 5 lb. of copper, and 8 oz. of cobalt per acre. Spring-sown pasture is topdressed in the following autumn, and autumn-sown pasture topdressed in the following spring. The topdressing programme thereafter depends on the thrift and carrying capacity of the pasture, but the quantity of fertiliser applied is reduced considerably after the initial build-up.

Further Drainage Required

One of the major considerations in the development and grassing of this peat land is of course getting rid of surplus water, and it has been found necessary to continue with mole draining after the pasture has become established. The seedbed for the grass is comparatively smooth, considering the preparation methods employed and the class of material that has to be worked. It is, however, necessary to continue with the mole draining of the sown-out area, and this combined with uneven consolidation of the peat results in a very uneven surface, particularly after about 3 years. This precludes the mowing of any surplus pasture growth and also tends to complicate the pasture and farm management problems.

Most of the development has been done on the shallower peat areas (3 to 6 ft. deep). Little has been accomplished on the deep peats, which are 15 to 16 ft. or more deep and are located on the more elevated areas of the block.

Naturally, and for economic reasons, the better land is being developed before the more difficult country is attempted. The results so far however are extremely gratifying.

Great Increase in Carrying Capacity

When development of this block of land was begun by the Department of Lands and Survey in October 1952 the carrying capacity was nil. Now 1,000 acres are sown out in a good vigorous association of grasses and clover (white clover does exceedingly well on the developed block) and the carrying capacity of this developed area is now 1,800 ewes, 600 hoggets, and between 70 and 80 cattle. Cattle are particularly useful in consolidation and development and the number of cattle grazed varies very considerably. Anything up to 300 are taken on during summer to try to control pasture growth.

The trend in all land development work in Southland is to introduce pasture as quickly as possible, provided this is compatible with other features of development as, for example, provision for winter feed. The technique of introducing grass as the first crop in the development of virgin country has been extended quite successfully to these peat lands, particularly to the shallower peat areas of the Waituna land development block.

Some of the early-sown pastures are now well consolidated and are excellent stock grazing areas, capable of supporting substantial stock concentrations and also of taking their place in Southland's main farming activity—fattening lambs.

◆

Remoteness Will Go in South Westland but Still Limits to Farming Expansion

By H. H. TOCKER,
Farm Management Officer, Department of Agriculture, Christchurch

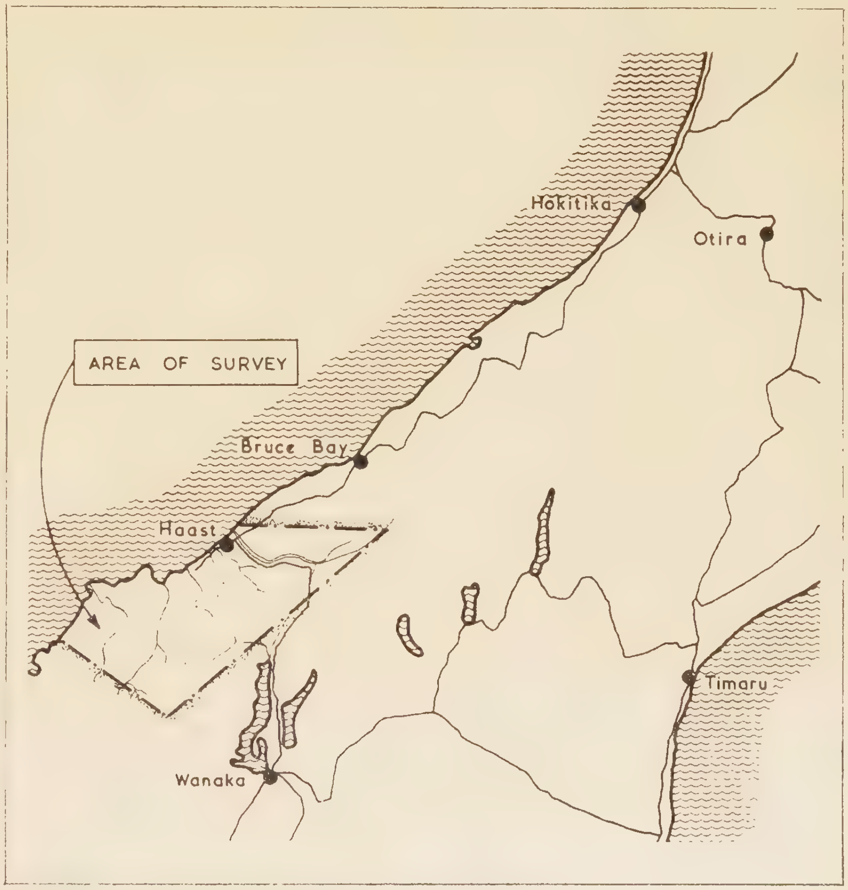
A MILESTONE in the lives of the handful of settlers of South Westland was recorded in the newspaper announcement on Monday 1 September 1958 that the new scenic highway through the Haast Pass linking Otago with South Westland was used commercially for the first time the previous week when the stores for the Ministry of Works camp and 150 bales of hay were carted into the Haast. Of still greater importance to the settlers, however, was that part of the news which told of the first commercial outward consignment—26 bullocks to the Burnside stock sale. The bullocks were carted 23 miles to the Clarke Bluff, unloaded, and driven 6 or 7 miles, including the crossing of the Haast and Burke Rivers, where the heavy loads might have been treacherous for the trucks. They were held overnight in specially constructed holding paddocks on the Otago side of the Burke River before being loaded on to a contractor's truck from Luggate for transport to Burnside. In less than a week these bullocks would be offered at Burnside saleyards, a considerable saving in time over the previous method whereby stock had to be driven overland through rivers and forest from the Haast to Whataroa saleyards—a journey taking about 3 weeks. The extent to which this long-awaited road access to South Westland may affect farming progress is assessed in this article.

A RECENT survey of South Westland revealed that about 8 per cent of the estimated total area of 1,150 square miles was suitable for farming and could be developed economically. Most of this vast area is either mountainous country and bush-clad hills or swamp and "pakihi". Land that could be developed for farming is restricted to the major river valleys or the light consolidated sand country along the sea coast. Both dairying and fat lamb production could be undertaken in a limited way, but the cost of land development would be fairly high and might not be economic under present costs and prices.

At present, beef cattle raising is the main system of farming and is augmented by the lucrative sidelines of whitebaiting and, to a less degree, crayfishing. The cattle are run on an extensive basis along the main river valleys, where they graze during spring and summer. In late autumn and winter they retire into the native bush to feed on broad-leaved scrub. They are mustered for drafting in May and September, those for sale being driven overland to Whataroa and auctioned to local farmers for finishing before being sent to the meatworks in Canterbury or to Addington saleyards.

Now that the Haast Pass road is open farmers will be able to send fat stock direct to Otago meatworks or to the Burnside saleyards, which will be a financial gain to the cattlemen of the Haast. Where formerly all stock were by necessity after the long overland drive sold as stores, modern transport will ensure that prime cattle leaving the Haast will reach their destination in top condition. This should give a much better return per head even after transport costs have been taken into account.

However, despite this benefit, it is doubtful whether the new road will result in any spectacular increase in primary production in the Haast. Rather, it is considered, it will enable the present occupiers to consolidate their present position and remain extensive graziers in preference to becoming farmers producing dairy produce or growing wool and fat lambs. The new road and modern transport, including the aeroplane, will banish the bogies of remoteness and distance from markets, but it cannot alter the 200 in. annual rainfall, which could prove to be the major deterrent to prospective dairy farmers and sheep farmers alike.



Pasture Mixture Trials; Oversowing Tussock

A GREAT deal of interest is being taken in a number of field-scale comparisons being made on dairy farms on the west coast of the North Island between Otaki and North Taranaki with mixtures of prairie grass, cocksfoot, and white clover and short-rotation ryegrass-white clover or perennial ryegrass-white clover pastures.

PRAIRIE GRASS, COCKSFOOT, WHITE CLOVER PASTURES

IN most trials farmers are cooperating with the Extension Division in making the comparisons, for which two equal and generally adjoining areas have been seeded, some in autumn 1957 and some last autumn, with the idea of comparing monthly grazing days throughout the year. Two trials have been established on the demonstration farms at Waimate West and Stratford, Taranaki, where in addition to grazing days, dry-matter production records are being kept. Further trial areas are likely to be established in the next year or so to give as wide a coverage of the dairying districts in this area as possible. It is not expected that there will be any reliable results from this investigation for several seasons.

The idea of trying out a mixture of prairie grass, cocksfoot, and white clover was initiated by the Fields Superintendent, Palmerston North, as a result of discussions on dairy farm pastures with a visitor to the 7th International Grassland Congress in 1956, Mr A. L. Hafenrichter, Plant Materials Technician, U.S. Department of Agriculture, whose headquarters are at Portland, Oregon.

While at the Waimate West Demonstration Farm Mr Hafenrichter remarked on the vigour of the prairie grass which had established in the ryegrass pastures and stated that in some of the dairying districts of Oregon, where climatic and soil conditions were very similar to those in Manawatu and Taranaki dairy country, a mixture of prairie grass, cocksfoot, and white clover was being used in preference to the ryegrasses and white clover on increasing areas of their dairy farms. He stated that the new type of pasture had a number of important advantages, the main ones being the production at all times of the year of feed with a better balance of carbohydrate to protein, thereby causing less dietetic troubles in stock and providing a more uniform quantity of feed through the various seasons. It was also stated that the two grasses combined better with white clover than did the ryegrass, which tended to smother the white clover at some times of the year and be overrun by it at others. The two grasses themselves, because of their different periods of maximum growth, also combined well in the production of feed for milking cows over a prolonged period each season.

Since both prairie grass and cocksfoot have been prominent in dairy pastures, especially in Taranaki and coastal areas further south, it was decided to try out the possibilities of these grasses in combination with white clover. Red clover has not been included in the mixture because of management complications likely to arise in the event of very wet summers and early autumn periods, when this clover can rapidly smother the other species.

—*C. J. HAMBLYN*

* * * *

Oversowing Clovers on Tussock Country

Experimental work and farm-scale applications of seed and fertiliser have shown that clover will establish well over a wide area of South Island tussock grassland.

FERTILISERS

Correct fertiliser treatment is essential for best results, and requirements will vary from place to place, possibly even on the same property.

Evidence is accumulating that on sulphur-deficient country increased rates of elemental sulphur, up to at least ½ cwt. per acre, are reflected in correspondingly better responses. Fortified superphosphate (containing added sulphur) is being manufactured to meet these requirements. The most frequently used mixture contains 400 lb. of added sulphur per ton; 1 cwt. of this per acre provides about 10 lb. of phosphorus, 10 lb. of sulphur as quick-acting gypsum, and 20 lb. of slow-acting sulphur, in total the equivalent of the amount of sulphur in 2½ cwt. of straight superphosphate.

TIME OF SOWING AND SEEDING RATES

In the oversowing of tussock swards invaded by browntop, fescue, and danthonia the time of sowing is important. Winter has proved most satisfactory for the operation, June and July being best in most areas. In the wetter, colder areas sowings as late as August (even September) have been reliable.

Provided fertiliser deficiencies are corrected, seeding rates may be low. Recommended rates are 2 lb. per acre each of red and white clovers. For high-rainfall areas the addition of 1 to 2 lb. of alsike is beneficial. The better strains of seeds are recommended, though extremely high purity is not essential, to ensure a stand of good-type clovers capable of making full use of improved soil fertility.

INOCULATION

Though a very large amount of this country can be improved without inoculation of the clover seed, on certain areas establishment of clovers is difficult owing to naturally low populations of nitrifying bacteria in the soil. Where such conditions occur all clover seed should be inoculated before sowing to ensure efficient nodulation by a good strain of rhizobia bacteria.

METHOD OF SOWING

Provided sowings are made in winter, aerial oversowing of seed and fertiliser is highly satisfactory for establishing clovers in tussock country. "Strip" effects due to uneven distribution can usually be overcome by cross dressings of seed and fertiliser, that is, by sowing half the mixture one way and the remainder across the line of original flight. This method, which involves more flying time but only the same number of take-offs and landings as "once-over" seeding, should be adopted wherever possible.

—*R. L. BENNETTS*

WEED IDENTIFICATION AND CONTROL

This is one of a series of articles illustrated in colour to appear in the "Journal" from time to time in which identification and control of various weeds will be discussed.

GORSE, undoubtedly the most widespread woody weed species introduced into New Zealand, is abundantly naturalised in both Islands in poor pastures and waste areas. It belongs to the legume family (*Papilionaceae*), the stems are furrowed, the leaves are reduced mostly to spines, flowers are bright yellow, and the calyx and pod are hairy.

UNTIL recent years gorse was increasing, particularly on hilly country and in waste areas. It covered hundreds of thousands of acres. Gorse, in the absence of plant competition, grows well on dry areas of almost any soil type. It normally spreads slowly from the seeds that are explosively ejected by the pods for distances up to several yards, but animals are responsible for carrying gorse seeds considerable distances from infestations.

Gorse seeds prolifically and the seed may remain viable in the soil for 10 or more years. In old infestations 10 to 15 million seeds per acre may be lying dormant in the soil.

An attempt to control gorse was made by the liberation of the gorse seed weevil (*Apion ulicis*) and it is estimated that it has reduced production of seed by about one quarter. The best method of permanent control is by productive pasture. Where infested farm land can be worked and sown to new pasture this should be done. Gorse will not germinate and compete with a good established pasture, even though the gorse seed content of the soil below is high.

Methods of Control

If the farm land is of low fertility, 2,4,5-T is helpful in controlling seedling gorse in establishing pasture until the pasture is of sufficient quality to arrest further germination.

On country too steep to be cultivated farm-improvement practices should be adopted before 2,4,5-T is applied. Such an area should be burnt, topdressed, oversown, and fenced so that proper grazing management can be employed. The gorse should preferably be burnt in full flower, as burning at this period kills a fair percentage of the original infestation. If gorse proves difficult to burn, a light rate of 2,4,5-T oil concentrate in 10 to 15 gallons of diesel fuel oil should be applied 2 to 3 months before burning to improve the burn.

By L. J. MATTHEWS,
Weeds Research Officer,
Department of Agriculture,
Wellington

Where the area is of good fertility and a satisfactory strike of sown species is obtained, there will be little gorse regrowth and establishment from seed if the new pasture is grazed correctly. Spot application of 2,4,5-T is all that will be necessary. On poorer soils sufficient gorse may grow to warrant aerial spraying, which gives satisfactory results on seedling and regrowth gorse. However, such blanket application of 2,4,5-T reduces materially the content of clover which may necessitate oversowing of more clover seed.

Chemical Control on Waste Areas

As gorse will not compete with a productive pasture, the need to control it in many waste areas is not as great as it was in the past, when adjoining pastures were of poorer quality. Old gorse should preferably be burnt or cut and the regrowths treated with 2,4,5-T when they have reached a height of several feet and are at least 2 years old. Large stumps can be killed by painting them with 1 part of oil concentrate of 2,4,5-T to 20 parts of diesel fuel oil. The stumps should be cut as low as possible and painted immediately after cutting.

Use of 2,4,5-T

In using 2,4,5-T as a foliage spray a complete foliage cover must be obtained. The best time of application for this is from October to March in most districts. In all cases a fine spray should be used. The amount of water applied with 2,4,5-T is immaterial provided a complete foliage cover is obtained without excessive run-off. The amount of water will depend on the type of equipment available and the conditions at time of spraying. The rate of application for seedling and regrowth gorse is not critical, but a rate of 2 lb. of acid equivalent per acre should be aimed at. Rates of 2 to 4 lb. are necessary for older gorse.

Misuse of 2,4,5-T

On farm land particularly quantities of 2,4,5-T have been misused for gorse control. Large areas of gorse have been sprayed and not replaced with more desirable vegetation. This has ultimately led to reinfestation by gorse or other undesirable species. It is always better to associate a spraying with the introduction of improved farm management and the sowing of desirable species and later to remove any surviving gorse by the application of 2,4,5-T.

TUSSOCK AREAS, because they were the only natural extensive grasslands in New Zealand, were occupied by graziers at an early stage of European settlement. However, overgrazing and burning, depredations of rabbits, and other factors for many years reacted unfavourably on returns from this class of country. With the introduction of the killer policy for rabbits, machinery for constructing access tracks at reasonable cost, and the aeroplane for topdressing, oversowing, and rabbit poisoning the picture has changed. Increases in carrying capacity and production and improvement in vegetative cover and consequently reduction in run-off that have followed topdressing and other soil-conservation measures on "Shenley", a grazing run in the Albury district, South Canterbury, are described in this article. The programme, carried out as a farm conservation plan, has to date produced results that suggest potential production levels on much of the tussock country which on its earlier history had not seemed remotely possible.

Tussock Grassland Improvement on *"Shenley"*

By H. A. ARTHUR,
Fields Instructor,
Department of Agriculture,
Timaru

IN 1851 the Rhodes brothers took up the first pastoral runs (the licences for which were not granted until 1854) in South Canterbury. These covered 150,000 acres, comprising all the land between the Opihi and Pareora Rivers and stretched from the coast westward to the Snowy Mountains, or what is today the Rollesby Range. The block of land with which this article deals lies along the eastern slopes of a range to the east of these Snowy Mountains.

By 1854 the Government realised that the original Rhodes' licences comprised a larger area than was permissible under the regulations and re-let a large block of the most westerly portion to Spencer Percival and William Dunnage, who named it "Albury" after a village in Devon.

Two years later "Albury" was granted as Crown land by the Canterbury Provincial Government to Edward Richardson as part payment for the construction of the Lyttelton tunnel. The station was taken over by the Bank of New Zealand in 1889 and was acquired by the Government in 1897 for cutting up for closer settlement.

About the time that "Albury" was leased to Percival and Dunnage the large adjoining Opawa block of 33,000 acres, was taken up by Kennaway and Acton, who sold to J. S. and R. Rutherford in 1870. Toward the end of the century the Government

"Shenley" homestead sheltered snugly among English trees and coniferous plantations.

acquired this property also and it was cut up and offered for selection on 9 March 1903.

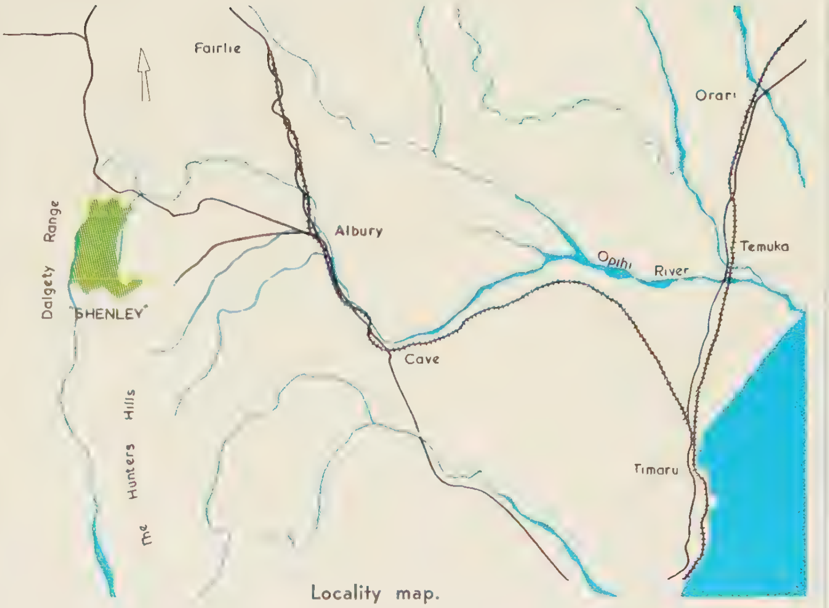
One of the small grazing runs of 4,644 acres was drawn by H. T. Winter, who named it "Shenley" after a village in England. Shortly afterward he took over two other leases, one of 1,766 acres from W. H. Simmons and the other of 1,580 acres called "Matata", from a Mr MacBeth.

In 1912 the late Mr H. H. Fisher, father of the present owners, purchased the above leases and soon after bought another 170 acres, a holding paddock at the northern end of the property.

For 40 years "Shenley" was held under different leases until in 1952 the tenure was made a pastoral lease renewable every 33 years and carrying a stock-limitation clause. (There is no right of freehold.)

Topography, Soils, Climate

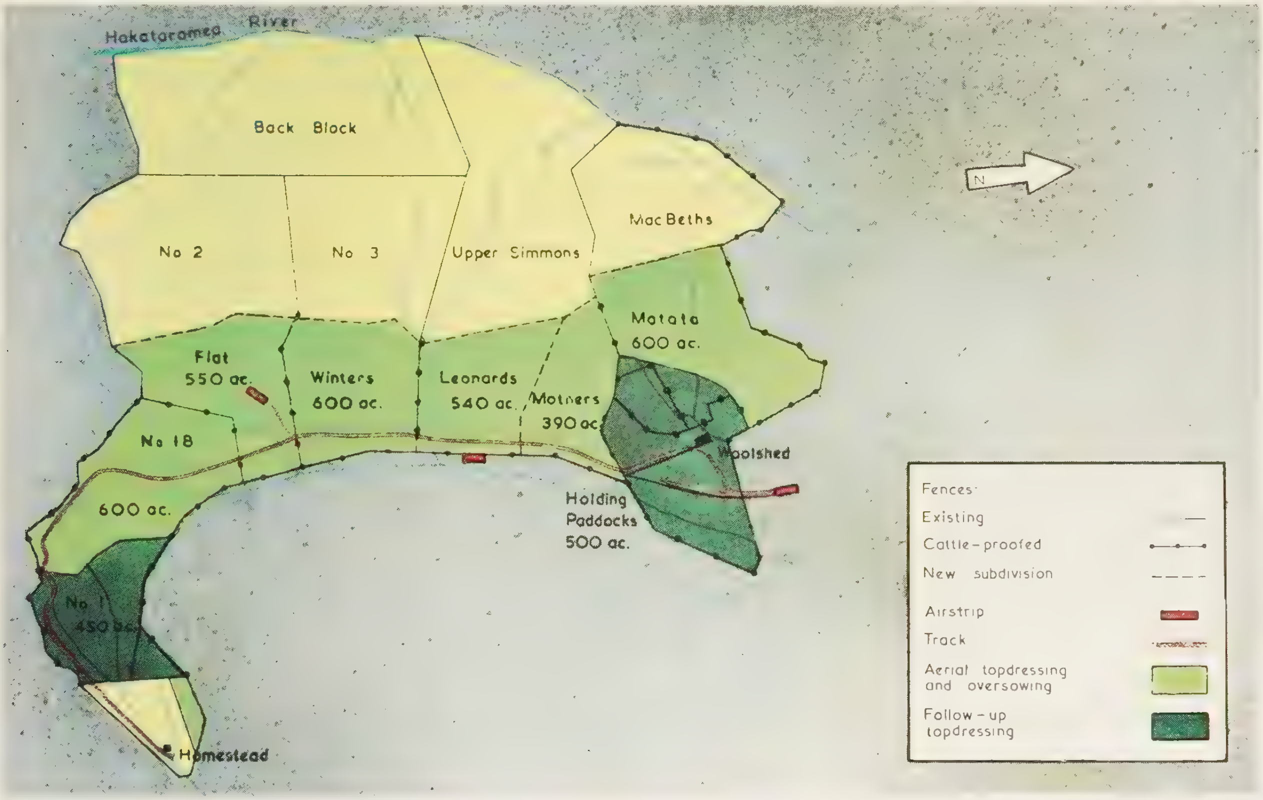
"Shenley" is on the eastern side of the northern end of the Hunters Hills, which run north and south and rise from an altitude of 1,600 ft. to about 4,000 ft. This gives the bulk of the run a north-easterly aspect protected from the drying north-westerly winds. The subsidiary ridges, which run approximately east and west, have dark southerly sides and dry northerly faces. Practically all of the run can be ridden over.


Fairlie
Orari
Dalgety Range
Albury
Temuka
Opihi River
"SHENLEY"
Cave
The Hunters Hills
Timaru

Locality map.

Two main soil types occur on the run. The lower slopes from 1,600 ft. to about 2.500 ft. comprise mostly the Hurunui series, which are derived from greywacke, and the higher slopes come into the Kaikoura series, which are derived from greywacke and mica schist. These are steeper soils with a thinner tussock cover and are more prone to erosion if overgrazed. The Hurunui soils are grey-brown or brownish-grey loams to stony loams between 6 and 9 in. deep overlying 12 to 18 in. of dark buff to yellow loam.

Farm Plan Showing Improvement Programme


Hakataramea River
Back Block
N
No 2
No 3
Upper Simmons
MacBeths
Matata 600 ac.
Flat 550 ac.
Winters 600 ac.
Leonards 540 ac.
Mothers 390 ac.
Woolshed
No 18
600 ac.
Holding Paddocks 500 ac.
No 1 450 ac.
Homestead
Fences:
Existing
Cattle-proofed
New subdivision
Airstrip
Track
Aerial topdressing and oversowing
Follow-up topdressing

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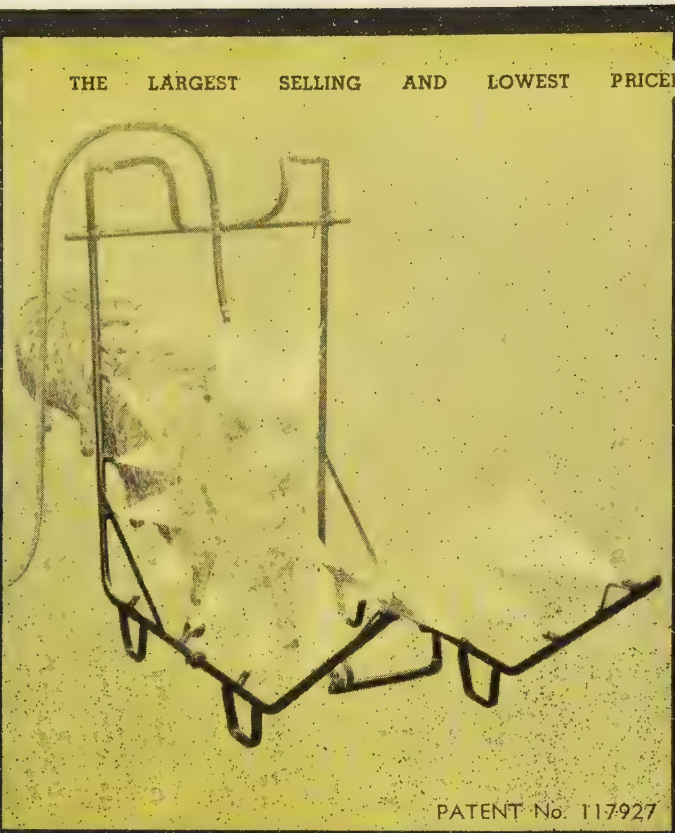

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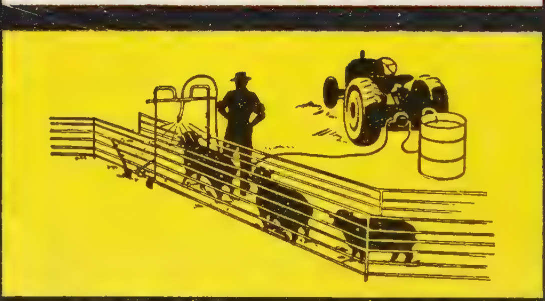

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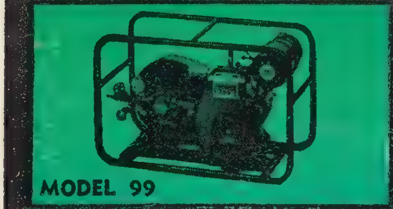
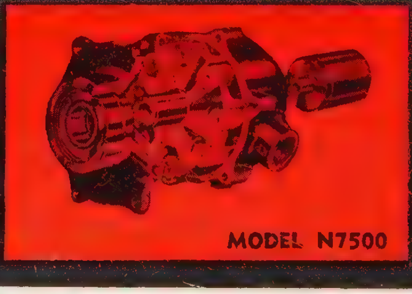


MODEL 99



MODEL N7500

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Rainfall at "Shenley" homestead averages 32 in. per annum, but is higher at the back of the run. Frosts are only moderate over most of the property, but can be rather severe on some of the lower places along the foot of the hills. There is no great snow risk except on two blocks.

Cover

The predominant cover up to about 3,000 ft. is silver tussock (*Poa caespitosa*) and hard tussock (*Festuca novae zelandiae*), with some blue tussock (*Poa colensoi*), which in some places can be found right to the top of the range. The bulk of the cover over approximately 3,000 ft., especially on the dark faces, is snow tussock (*Danthonia flavescens*). The snow tussock is by no means confined to the higher levels, some of the lower, shady, and even open country having a dense cover of this tussock.

Some native grasses are also present. Prominent among these are *Danthonia pilosa*, blue grass (*Agropyron scabrum*), and plume grass (*Dichelachne crinata*); on the wetter low-lying areas there are large areas of Maori onion (*Chrysobactron hookeri*).

Introduced species such as Yorkshire fog, sweet vernal, catsear, yarrow, and small amounts of browntop and fescue are also present. White clover and suckling clover can be found in most places. White clover has established itself in some of the higher basins which have been built up in fertility by wind-blown material.

Sheep being driven along the access track toward the shearing shed.

Though white clover has established without stimulation from phosphatic topdressing, it is stunted and unproductive. The contrast between topdressed oversown clovers and the wild white is very marked. The topdressed plants from certified seed are very vigorous and have seeded prolifically, while the self-sown clover is poor and sets little seed.

On some of the screes and other places there are dense associations of matagouri (*Discaria toumatou*) and it has been found necessary to burn some of the areas to keep it in check and to allow sheep access to the feed. Native tussocks and grasses seed prolifically among the scrub.

Blue tussock (*Poa colensoi*) seeding profusely among matagouri (*Discaria toumatou*).

Subdivision

In 1912 the run was subdivided into 7 main blocks, 5 of them over 1,000 acres each. Today, the property is divided into 16 blocks. (See plan on page 123.)

About 100 acres of ploughable land adjacent to the homestead is subdivided into 8 paddocks, some of which are in excellent mixed pastures consisting of ryegrass, white and red clovers, cocksfoot, timothy, and crested dogstail. Some winter feed (roots) are grown (2 years in succession) and hay is cut from the pastures, which are in excellent condition and are maintained by annual topdressing.

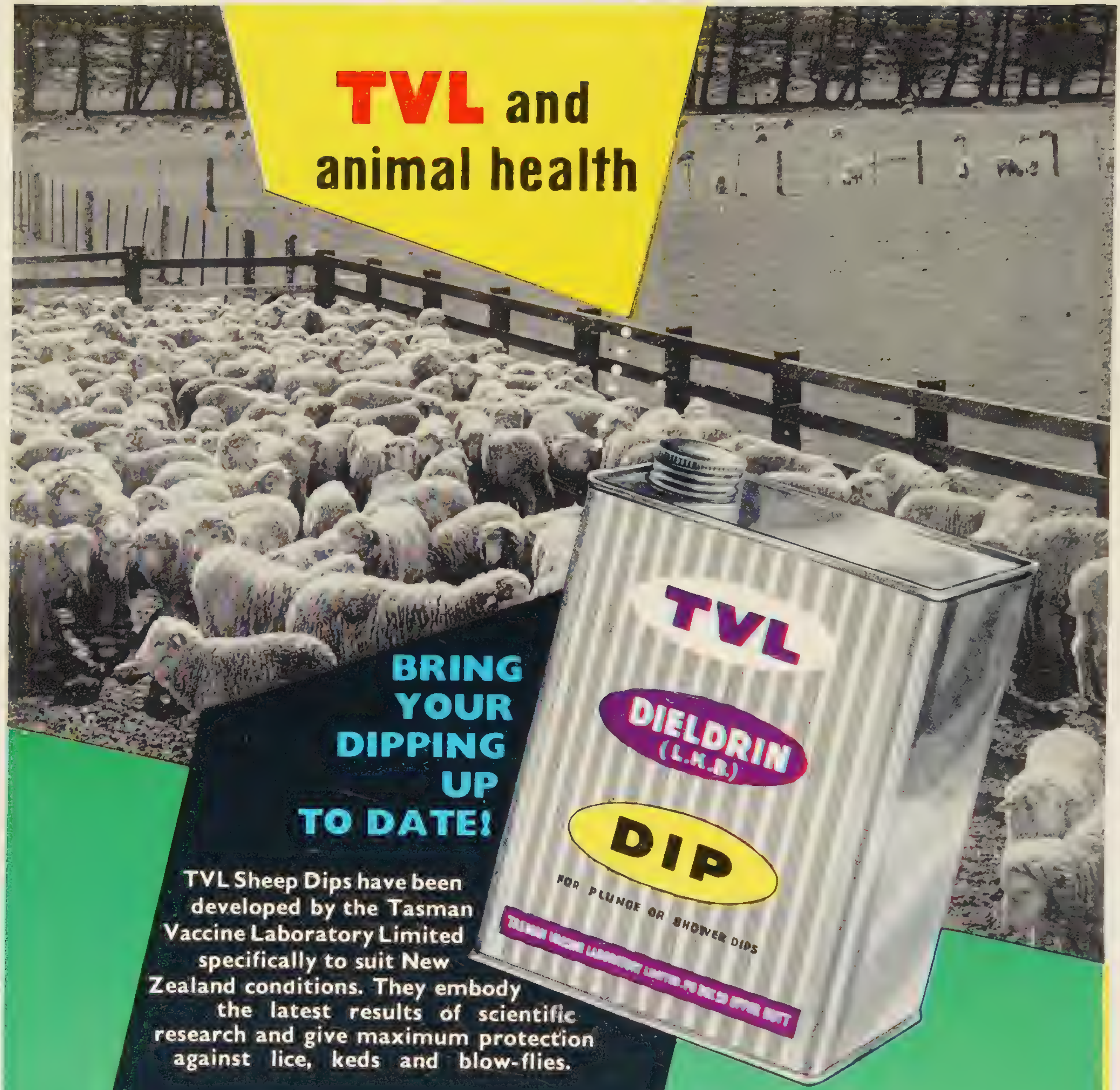
Labour

Employed on the run at present are a single and a married shepherd and a married general hand. The second shepherd has only recently been engaged. All of the run with exception of two blocks can be mustered by two men.

Improvement Programme

With the introduction of aerial topdressing in South Canterbury about 1950 and in view of the results obtained from some topdressing trials carried out on "Stanton", a run further north along the range, Mr Fisher realised the great potential from applying superphosphate to his type of country and decided to start an improvement programme of topdressing, seeding with grasses and clovers, fencing, roading, and tree planting.

In May 1950 as an experiment he had 10 tons of reverted superphosphate spread in strips from the air over a block of 400 acres. The total area topdressed was about 145 acres. The



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superphosphate was put on in strips to save cost. The strips were one run sown with a corresponding width missed. In February 1951 another 10 tons of reverted superphosphate was put on 200 acres of the same block, and in March 1952 a further 20 tons of reverted superphosphate was spread over the whole 400 acres. This made a total of 2 cwt. of superphosphate over the 400 acres in 3 years. Results were sufficiently encouraging to justify large-scale topdressing and oversowing.

Control fencing was begun in 1951, when the 400 acres of lower altitude country already mentioned was cut off from a larger block. By this time about 3 miles of the access track had been completed. Two airstrips were planned in addition to the one already constructed.

The whole improvement programme depended on three major undertakings:

1. **Topdressing and oversowing to improve the carrying capacity and farm income.**
2. **Erection of new subdivision fences and the cattle proofing of existing fences.**

The topography of the run and existing fencing (see plan) made "Shenley" admirably suitable for this further subdivision.

The object of the fencing programme was to cut off the lower portions of each block so that stock could be concentrated on either the higher or the lower portions as the feed position dictated. This is discussed later under stock management.

3. **The construction of access tracks. These were the key to the whole development programme.**

The main track runs the whole length of the property (see plan) and provides access from a public road at each end. Along it manure and seed can be brought by truck to the airstrips and fencing and other materials transported quickly near to where they are required. Sheep can be driven along it with a minimum of effort and time from place to place and men can move quickly by jeep, lorry, or on horseback.

The establishment of shelter belts was also included in the improvement scheme.

Excellent clover sward and healthy tussock resulting from aerial topdressing and oversowing.

Conservation Aspect

To promote the Opihi Catchment Control Scheme the Soil Conservation and Rivers Control Council agreed to assist the South Canterbury Catchment Board by organising six cooperative demonstration farms in the catchment to show the value of conservation farming. After inspection of "Shenley" in May 1952 by officers of the Soil Conservation and Rivers Control Council, South Canterbury Catchment Board, and Department of Agriculture, Mr Fisher agreed to carry out an intensified development programme incorporating subsidised conservation practices.

The conservation farm plan has been implemented over the past 5 years. Measures embrace oversowing and topdressing of blocks on the lower portion of the run (below 3,000 ft.), subdivision fencing, and cattle proofing of existing fences to give adequate control of grazing. The construction of access tracks for carting of fencing materials to fencelines and fertiliser to airstrips and planting of trees for stabilising and shelter and stream and gully control were also included in the plan.

The programme is a 6 year one with the total cost to be kept under £8,900. This includes £1 for £1 subsidy for conservation and farming practices new to the area.

Generally, the vegetative cover of Mr Fisher's run is reasonably good. Above 3.000 ft., however, the cover is less dense and the soil not so stable, resulting in some movement of shingle from the area to the creeks and so into the river system.

In the past there was a tendency to overgraze the sunny slopes at the expense of control of growth on the shady, back faces. Periodic burning of back faces therefore became necessary. Frequently burns spread easily on to the higher slopes and subsequent concentration of stock caused some depletion of the vegetation due to inability to recover adequately. Realignment of fences to separate the higher from the lower country was the first step. Topdressing, reseeding, and closer subdivision of the lower blocks have done much to eliminate the rank growth on the back faces. This to a large extent has removed the need for regular burning.

The conservation plan aims at improving the vegetative cover not only by topdressing and oversowing but by better control of grazing as the result of closer subdivision.

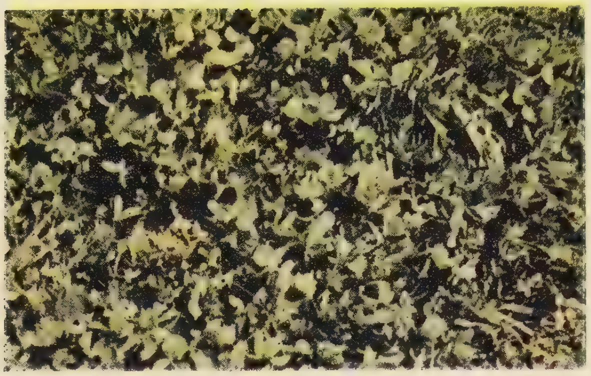
Trials

To find the best manurial treatment for "Shenley" and other similarly situated properties the Department of Agriculture laid down on 16 December 1954 a simple observational topdressing trial at the northern end of the run. Plots were topdressed with gypsum (calcium sulphate) at 130 lb. per acre, double superphosphate (which contains no sulphur) at 1 cwt. per acre, and superphosphate at 2 cwt. per acre. Cross treatments of lime, molybdenum, and lime plus molybdenum were applied.

The only responses were on the gypsum and superphosphate plots.

The next year a more comprehensive topdressing trial (one of a series throughout the district) was laid down. Seven trace elements (molybdenum, sulphur, magnesium. zinc, boron, vanadium, and copper) were used singly and in combination. Half the trial received a basal dressing of 1 cwt. of double superphosphate per acre. This trial was at the southern end of the property.

Again the only responses were on plots receiving sulphur. Responses to 28 lb. of sulphur were most striking and as good as those obtained from



Clover on the block topdressed with gypsum.

Cocksfoot, timothy, ryegrass, and mixed clover sward on paddock near the homestead.

the application of 2 cwt. of superphosphate. As there was no response to double superphosphate, which contains no sulphur, the big responses to superphosphate achieved on this property were being gained from the sulphur rather than from the phosphate (1 cwt. of superphosphate contains 11 lb. of sulphur). When fortified superphosphate (400 lb. of sulphur per ton of superphosphate) became available 1 cwt. of this mixture per acre supplied the equivalent of 29 lb. of sulphur. It thus achieved the same result as that obtained by applying 2 cwt. of straight superphosphate, thereby reducing cartage and spreading costs.

Fencing

The fencing programme has been as follows (see farm plan):

1953-54, Block 1: 51½ chains of new fence, 80 chains of renewed boundary, and 160 chains of cattle-proofed boundary.

1954-55, Leonard's and Winter's: 67 chains of cattle-proofed internal fences, 125 chains of renewed boundary.

1955-56, Mother's and Leonard's: 219 chains of new subdivision fences, 176 chains of renewed boundary.

1956-57, Winter's No. 3: 93½ chains of new subdivision, 166 chains of cattle-proofed boundary.

1957-58, The Flat No. 2: 105 chains of new subdivision, 73 chains of cattle-proofed boundary.

1958-59, Matata and MacBeth's: 74½ chains of new subdivision, 290 chains of cattle-proofed boundary; Flat and Winter's: 94 chains cattle-proofed boundary; MacBeth's, Mother's, and holding paddocks: 130 chains of cattle-proofed boundary.

Twenty-one chains of fencing have also been erected to protect a planting of 4,500 trees.

Cost

The cost of new fencing was £308 per mile in 1953 and £460 per mile in 1956. The rise in the cost of standards was the main cause of this increase.

The fencing has been done by contractors and the materials delivered on to the fencelines by bulldozer, tractor, and 4-wheel drive utility. Small amounts have had to be packed to the job.

Where possible a bulldozer has been used to cut down the benches on the fenceline, thus allowing a better fence to be erected with fewer tie-downs. This has also reduced erection and maintenance costs. Fences erected on a bulldozed site are also less liable to stock damage, as beasts can pass along a fenceline without being crowded into the fence.

Book Review

"Food and People"

THIS series of articles from the Reserve Bank's monthly bulletin endeavours to provide a comprehensive summary of one of the world's major and most complex problems and as such it will be a valuable source of reference.

Two points of criticism are, first, the lack of any critical analysis of some of the authorities quoted and, secondly, the absence of reference to the creation of artificial surpluses and the disruption of trade caused by the policies of agricultural protectionism of all the world's major industrial countries.

—*J.V.W.*

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Access Track

Before the new programme was begun 3 miles of track had been formed by bulldozer for £150. The roading was pushed ahead under the scheme and the final 4 miles completed at a cost of £197. Improvements costing £50 were made a year later. The total cost for 7 miles has therefore been £397. Some improvement is still needed, such as spreading shingle in shady places and installing some culverts.

Airstrips

Three airstrips at strategic points have been constructed. They are accessible from the new track.

One is on an adjoining property at the north end of the run, another is in about the centre of the run, and the third is on the flat toward the south end; topdressing can therefore be done with the minimum of flying time. The spacing of the airstrips makes it possible to cover any part of the country with a maximum of 3 miles flying distance.

Topdressing

About 400 acres had been topdressed and seeded during 1950-51 and 1952—before the scheme for intensification of improvement came into operation. The new programme aimed at topdressing and seeding the lower part of each block as it was fenced off from the higher country.

In 1954 all the holding paddocks and part of the Matata block of 600 acres were topdressed with 1 cwt. of superphosphate in late autumn and seeded in strips through the block in early spring. Seeding of the whole block was considered too costly, especially as some clover had become established on the country and it was expected that stock would distribute further seed.

During this topdressing ½ ton of molybdic superphosphate was spread and the runs pegged, but there were no definite visible results from the molybdenum.

In 1955, 900 acres were topdressed in autumn with 1 cwt. of superphosphate per acre and seeded in spring. In the 1956 programme the amount of superphosphate was increased to 1½ cwt. per acre and a further 600 acres were done.

From results obtained from the trials laid down by the Department of Agriculture it seemed obvious that resulting growth on the earlier-topdressed areas was produced to some extent at least by the sulphur in the superphosphate as well as from the phosphate, so 550 acres were topdressed with 1 cwt. of gypsum and another 600 with 1½ cwt. of superphosphate.

In autumn 1958, 400 acres of Matata not previously topdressed were done and a further 500 acres consisting of holding paddocks and part of Matata topdressed 4 years previously. This last area was oversown in spring. Sulphurised superphosphate (400 lb. of sulphur per ton) at 1 cwt. per acre was used for topdressing and the cost was £1 6s. 2d. per acre spread.

Bulk superphosphate is used and is dumped in containers made from shutters 4 ft. high and 12 ft. long. These shutters are stored while not in use to protect them from deterioration. Lime is spread on the ground before superphosphate is dumped.

Seed Mixture

The seed mixture used for oversowing is 4 lb. of cocksfoot, 2½ lb. of a mixture of white clover, alsike, and Montgomery red clover, and ½ lb. of dogstail.

Sheep

For many years the flock has consisted of Romney cross ewes. Romney rams, Romney-Merino half-bred rams, and some Lincoln-Merino half-bred rams have been used, but the present policy is to work toward a flock of straight Romneys. Romney-Merino rams were used to keep the flock fine woolled and to produce sheep which would range freely over the steep country. Romney rams have now replaced the half-bred rams because it is felt that straight Romney sheep will use the improved herbage better than half-bred sheep.

When the run was taken over by the late Mr H. H. Fisher in 1912 it was carrying 3,600 sheep and no cattle. By 1950 there was very little change; there were 3,753 sheep and the wool clip was 26,639 lb. or 6.5 lb. per head. The lambing percentage was 83.

The following figures show how the topdressing and oversowing are influencing production from this run:

	No. of sheep	Total wool lb.	Wool per head lb.	Lambing percentage
1953 ..	3,677	26,460	7.2	82
1954 ..	3,736	28,815	7.8	80
1955 ..	3,982	31,682	8.0	87
*1956 ..	4,294	31,343	7.3	87
1957 ..	4,702	†30,943	6.6	88
1958 ..	‡4,890	—	—	—

* Drought year.
† 2,911 sheep pre-lambing shorn for first time.
‡ June.

The 1953 flock consisted of 2,613 ewes, 847 hoggets, and 217 wethers and rams. The most recent comparable figures (1957) are: 3,007 ewes, 1,265 hoggets, 85 rams, 325 wethers, and 20 others.

Increased lambing percentages are going a long way toward providing the necessary replacements to build up the ewe flock.

Management

Grazing management has been changed since the improvement programme was begun. All ewes are age branded at shearing and the rams put out in the first week in May. The 2-tooths are tupped separately. The rest of the flock is drafted into two mobs according to wool type and suitable rams are put with them. The rams are taken out in the middle of June and the ewes redrafted into their age groups. The younger ewes are put on to the lower, better blocks and the remainder on to the higher blocks known to be safest during heavy falls of snow, though generally snow risks are slight.

After crutching in August most of the ewes are put on higher country to allow the lower blocks to get away and provide better lambing feed in October. The ewes are kept in their age groups when they are brought on

↓ Sheep being drafted for shearing. The yards are naturally well sheltered and there are well planned plantings of pines and willows.

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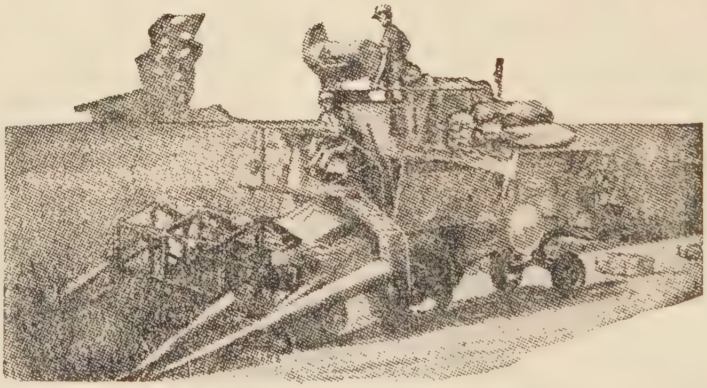

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The western boundary of "Shenley" is along the tops of the hills in the background, which run approximately north and south. The spurs run east and west and thus have shady and sunny faces. One airstrip is in about the centre of this illustration.

to the lower country for lambing, where they remain until weaning.

In 1957 the 2-tooth ewes, hoggets, and other dry sheep were blade shorn in September and the older sheep in late December. The hoggets are usually shorn in October or November, but earlier shearing has been adopted because, with the increase in the number of ewes, it saves employing extra labour.

It is expected that this pre-lamb shearing will simplify general management.

In 1955-56 and 1956-57 about 600 wether lambs were kept to graze the higher country, but this has not been found necessary, as ewes after weaning graze this high country quite satisfactorily. About half of the ewes are wintered on the higher blocks, with little snow risk, and half on the lower ones.

Up to 200 fat wether lambs have been drafted in each of the last 2 years. That this practice is economic is questionable, as these fats if left in the mob would improve the appearance and price of the whole line when sold as store lambs.

Cattle

The first cattle were bought in 1953 and consisted of 26 Aberdeen Angus heifer calves. With the natural increase and buying in, numbers have been increased until there are now 124 cows, 27 yearlings and heifers, and 3 bulls.

Management

Cattle are used mainly to clean out rough, dense growth unpalatable to sheep on the lower blocks. When not required here they are shifted on to the higher ones. They are very effective in cleaning up creeks and swampy places and open up the snow grass areas.

The bulls are put out on 1 December with mobs of 45 cows and are changed round every 3 weeks. The cows usually calve on the lower country. Steer calves and heifers not required for replacements are sold at April cattle sales.

More cattle could have been used to advantage, but to keep down costs numbers are being built up only from natural increase.

Lessons from Development

The access track is the key to the successful development of this property. Without the track phosphate could not be delivered to the airstrips. The track facilitates the movement of stock and staff and allows fencing and other materials to be transported to positions near where they will be used.

Subdivision must precede topdressing and seeding so that extra feed can be used fully.

Sulphur is the most essential element required, and fortified superphosphate spread at 1 cwt. per acre appears from experimental evidence to be the most satisfactory fertiliser to use.

Use of bulk superphosphate saves labour and costly delays. Mr Fisher is a staunch advocate of bulk superphosphate bins at country railway stations. Bulk supplies ensure that fertiliser is available at any time.

Oversowing: The seeding rates of clover used at 1½ lb. of a mixture of white and alsike might be a little low. On most of the foothill country alsike does very well and 1 to 1½ lb. of certified white clover plus 1 to 1½ lb. of alsike would be preferable. The 1 lb. of red clover is satisfactory, and the ½ lb. of dogstail is worth while, but up to the present very little return is discernible from the 4 lb. of cocksfoot sown, though it has shown up on trials laid down at McKenzie Pass in 1952.

Elimination of burning: Both cattle and sheep are grazing the high country and it appears that burning will not be necessary on the run in future except where matagouri is becoming aggressive.

Stock numbers were practically static for 40 years (1912, 3600 sheep; 1953, 3,677 sheep). Today, there are about 4,900 sheep and over 150 cattle on the run. This increase has been brought about largely by topdressing and oversowing. Greater increases can be confidently expected.

This cooperative demonstration farm has amply proved that the conservation farming practices employed in a planned programme of development have been practical and successful, not only because of the extra stock carried but because of the better cover and stability of the soil.

Acknowledgments

This article was begun by the late R. P. Hunter-Weston, Instructor in Agriculture, Department of Agriculture, Timaru, who collected much of the information.

The author also thanks Mr Fisher for his great help in supplying data for this survey, Mr Rowell of the South Canterbury Catchment Board for his help with the conservation aspect, and Mrs P. R. Woodhouse of "Blue Cliffs Station" and Mr W. Vance for assistance with the historical information.

Care of Livestock during March

Contributed by the Animal Research Division

LENGTH OF LACTATION IS IMPORTANT

IF dairy cows are well fed, they do not need more than 60 days' rest between lactations. Dairy Board statistics show that the average length of lactation in New Zealand is only 248 days. Production could be materially increased by milking cows longer. A good rule is to continue milking a cow while she is giving more than 10 lb. of fat per month, unless she is within 60 days of calving.

CULLING OF EMPTY COWS

A cow should never be culled for sterility without being examined for pregnancy by a veterinary surgeon. Many cows thought to be empty have proved to be in calf when slaughtered at the works. The presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent of such cows hold when mated in the following season.

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under 6 weeks of age, they can be prevented only by vaccinating the ewes. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping, and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection. Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirit and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over 6 weeks of age. Where such losses occur it is necessary to vaccinate the lambs themselves.

FEED HAY TO CALVES

Calves should have access to good hay at all times. It is particularly valuable after the first autumn rains, and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly growing pasture. Make sure that the calves are rotated through the paddocks at intervals of a few days. Set stocking at this time of the year is bound to result in scouring, unthriftiness, and some deaths.

SLEEPY SICKNESS IN EWES

This disease, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in autumn for grazing by the ewes for 3 weeks before lambing. Short-rotation ryegrass is particularly valuable for this purpose, as it continues to grow during winter even in Southland.

LEAD POISONING IN CATTLE

Many cattle die from lead poisoning each year. Common sources of lead on the farm are old paint tins, discarded scraps of metallic lead, and old batteries. These should be buried or disposed of in such a way as to prevent cattle from having access to them. Calves frequently suffer from lead poisoning through licking painted surfaces, and care should be taken to prevent this.

BLOWFLY STRIKE IN SHEEP

Blowfly strike is likely to occur in showery autumn weather when the humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool so as to leave a clean margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat with a good non-irritant dressing. Jetting with preparations containing DDT, BHC, diazinon, dieldrin, or aldrin will protect against blowfly strike for several weeks.

Pasture Production

Seasonal Notes by the Extension Division

DURING the last few years increasing interest has been taken in pasture improvement by the introduction of the seed of desirable species into existing pastures.

Surface sowing, sod seeding, and chemicals all play important parts. The first of these notes deals with the mechanical features of sod seeders.

SOD SEEDING MACHINES FOR THE SOUTH ISLAND

WHEREAS clovers can generally be established by broadcast sowing, in the main grasses need to be sown into the soil for successful establishment. In the tussock and browntop areas of the South Island the sod seeder offers the cheapest means of introducing improved grasses in these swards in so far as it eliminates the necessity to prepare the conventional seedbed. As it will be working on rough ground, the seeder needs to be robust. When the ground is very undulating the machine should be constructed so that each coulter can rise and fall independently of its neighbours. The coulters may be of the disc or hoe type and if the latter is used, a wide variety of points is available from which to choose the most suitable for the area. The disc type is not suitable for stony soils. If the hoe type is used in bouldery country, individual spring trips on the coulters will be an advantage.

A machine with a double seed and fertiliser box is preferable and it is advantageous to adjust the sowing mechanism to the lower rates and then speed up the drive to the mechanism to achieve the desired rate per acre. In this way the bunching of seed and fertiliser from a slow-moving mechanism is overcome. In all but stiff clay soils individual trailing chains fitted behind wide points of hoe coulters will cover the seed with soil crumbs from the side walls and this can be a definite advantage if drying winds are experienced after sowing. The trailing chains should not have cross links or they will ride over tussocks, snag on rocks, or catch in woody plants. A number of different types of sod seeders is now available and before making the final choice would-be purchasers are well advised to check on the results in soils similar to their own.

—*C. J. CROSBIE, Christchurch*

* * *

SHORT-ROTATION RYEGRASS

SHORT-ROTATION ryegrass is a hybrid derived from the crossing of Italian and perennial ryegrass and combines most of the desirable characters of the two parent species. Its main advantage is high winter and early spring production, when, if conditions are suitable, it provides a large quantity of high-quality feed. Though not as permanent as perennial ryegrass, it is longer lived than Italian ryegrass, and it has persisted on some dairy farms for up to 10 years. It requires fertile soil conditions and a reasonable supply of moisture to produce satisfactorily and under conditions of low rainfall and summer droughts it will usually disappear from a pasture.

This grass will not tolerate prolonged periods of hard grazing and thrives best under a system of rotational grazing. It has a place on both dairy and sheep farms provided soil conditions and management are satisfactory.

Short-rotation ryegrass is normally sown at from 6 to 12 lb. per acre in a pasture mixture with some perennial ryegrass, depending on local circumstances. It can readily be introduced into an existing pasture by sod seeding or oversowing, provided soil fertility is adequate. Seeding rates when it is sown in this manner are 6 and 12 lb. per acre respectively and the job should be done in autumn when the soil is moist. Existing plants within a pasture can readily re-establish themselves from shed seed, and a cheap and effective way to introduce this grass on to a property is to feed out late-cut hay containing an appreciable amount of short-rotation ryegrass.

—*A. V. ALLO, Tauranga*

* * *

AUTUMN PASTURE MANAGEMENT ON DAIRY FARMS

MUCH can be done in autumn to improve pastures, to prepare them for continued good feed production next season, and to remedy faults in composition, especially in the proportion of clovers to grasses which may have developed during spring and summer.

Topdressing: The first response to phosphate, potash, or lime is made by the clovers, which are then able to supply more nitrogen to the grasses and help them to renew the root system ready for strong growth in spring. Autumn topdressing should therefore be done as early as possible so that the clovers can respond before growth is checked by cold weather. There is generally no need to wait until the pastures are cleaned up, because the first autumn rains will wash the fertilisers into the soil.

Cleaning up: Old, dried-off top growth should be cleaned up, however, as soon as possible, because it is quite useless as feed later on and the shading and smothering effect of this growth hinders the production of fresh growth with the autumn rains and prevents the clovers from spreading evenly through the pasture. Another job which should be attended to as soon as there has been sufficient rain is the spreading of animal droppings, which are generally dry and hard in autumn and can do a lot of damage to good pastures if left undisturbed.

Renovating pastures: Where the grasses have been thinned out and the sward is likely to be clover dominant autumn is the time to re-establish the grass. Sod seeding or overdrilling is generally much more effective than broadcasting, and short-rotation ryegrass establishes better than perennial ryegrass or cocksfoot. Before any renovation is done, however, the top few inches of soil in various places in the paddocks should be carefully examined to see if the loss of grasses has been due to grass-grubs.

Treatment for grass-grub: Early autumn is a good time to look out for the effects of grass-grub on pastures. Pastures affected should be topdressed with DDT superphosphate or DDT serpentine superphosphate, the fertiliser being applied at a rate to give a dressing of 2 lb. of 100 per cent para para isomer of DDT per acre.

For quick stopping of the attack to prevent severe damage to the pastures the dry mix should be used, but for proofing of pastures against grass-grub the wet mix is equally satisfactory.

Preparation for autumn-saved grass: Paddocks to be shut for autumn-saved grass should be selected for their ryegrass content and these should be among the first to be cleaned up and topdressed and harrowed to spread droppings. Heavy grass-grub infestations can reduce production from these paddocks and they should be given a good look-over for grass-grub.

—*B. A. J. SMITH, Hawera*

Conservation of Farm Dairy Water Supply

By M. H. COPPELL,
Farm Dairy Instructor, Department of Agriculture, Hawera

A SIMPLE, unusual, and inexpensive system of water conservation installed on his farm by Mr H. J. Finlay, Tokaora, Hawera, proved last season to be both efficient and foolproof and enabled maximum use to be made of a very limited water supply which is now adequate for both milk cooling and stock drinking.

A LIMITED water supply is derived from a 26 ft. well having a maximum head of only 6 ft. of water. The whole of the water used for milk cooling is retained in the concrete surface tank shown in the accompanying schematic drawing and is later used to supplement the well water supply, which is pumped as required to 15 troughs conveniently situated over the farm, each of which is fitted with a high-pressure ballcock.

Enough drinking water is provided for up to 100 head of stock; 70 cows are milked at present.

In the past the whole of the milk cooling water, about 500 gallons daily, ran to waste down the dairy drain, creating cesspools and stagnant areas near the dairy premises, and there was not enough drinking water for the stock.

Surface Concrete Tank

The 250-gallon-capacity surface concrete tank is fitted with a ½ in. high-pressure ballcock that operates upside down and ensures that the warm water flowing from the milk cooler is retained and prevented from being recirculated through the cooler.

The conical weight is shown raised in the drawing so that the ballcock is released to a floating position and the valve opens. When the ballcock opens the whole of the stored water in this tank is pumped away to the farm troughs as required and when the tank is emptied the ballcock closes and the pump reverts to drawing on the well water supply.

The warm water from the cooler during pumping from the tank is prevented from returning to the well by the foot valve fitted at the bottom of the suction pipe at the well.

The conical weight above the surface tank is held in position by a chain and for convenience is operated from the milk room. This weight is raised or lowered over the ballcock and held in the desired position by the chain being pinned to the milk room wall.

Milk Cooling

To begin milk cooling the conical weight is gently lowered over the ballcock in the surface concrete tank. This closes the ballcock so that the water entering the tank is prevented from being pumped away.

The wheel valve on the water pipe leading to the cooler is then opened to allow the well water (temperature 56 degrees F.) to enter the bottom of the cooler. When it comes out the top of the cooler it flows by gravitation through a rubber hose and 1¼ in. pipe to the surface tank.

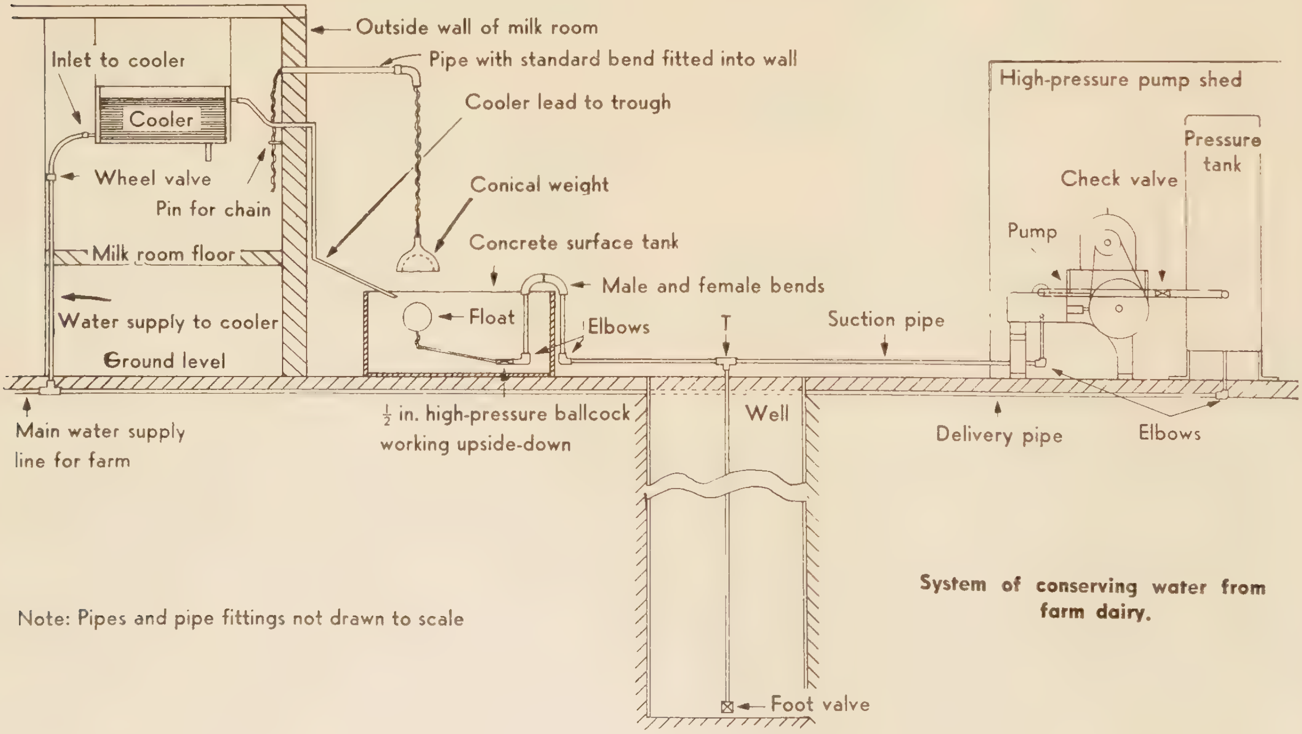
It is unnecessary to have a valve fitted on the main water supply line to farm troughs, as there is sufficient pressure in the system on opening the valve at the cooler to provide a good flow of water through the cooler.

When milk cooling is completed the valve at the cooler is closed and the chain-controlled conical weight is raised (as in the drawing) off the ballcock, which then opens and permits the stored water to be pumped away as required.

The tank water is always drawn away before the water in the well.

A greater demand on water for cooling if more cows are milked can be met by increasing the size of the surface tank.

There is no likelihood of use of this system making the water unfit to use either at the dairy or for stock drinking.


Outside wall of milk room
Inlet to cooler
Pipe with standard bend fitted into wall
Cooler
Cooler lead to trough
Wheel valve
Pin for chain
Conical weight
Milk room floor
Concrete surface tank
Water supply to cooler
Male and female bends
Float
Elbows
T
Suction pipe
Ground level
Main water supply line for farm
½ in. high-pressure ballcock working upside-down
Well
High-pressure pump shed
Pressure tank
Check valve
Pump
Delivery pipe
Elbows
Foot valve
Note: Pipes and pipe fittings not drawn to scale

System of conserving water from farm dairy.

Bitter Pit in Apples

By C. E. WOODHEAD,
Pip Fruit Specialist,
Department of Agriculture, Palmerston North

BITTER pit, a serious disorder of certain apple varieties grown in New Zealand, causes a considerable reduction of the marketable crop in some years. This article discusses orchard conditions and practices that encourage the development of bitter pit and the means by which its incidence may be lessened.

Symptoms

BITTER pit occurs as small, scattered brown spots of a spongy appearance in the flesh of the apple, commonly at or within ½ in. of the surface and more prevalent toward the calyx end of the fruit (Fig. 1). Pits may also be deep seated in any part of the flesh outside the core; thus the disorder may not be seen until the fruit is cut. Surface pits cause circular brown or dark brown depressions in the skin of the apple (Fig. 2).

Bitter pit may appear while the fruit is still on the tree. but is most serious as a disease of stored apples. Its incidence is closely related to variety, some varieties being highly susceptible and others resistant. Among the former are Cox's Orange Pippin and Cleopatra. Other susceptible varieties include Gravenstein, Sturmer, and Lord Wolseley. On the other hand bitter pit is rarely seen in Delicious and Dougherty.

Cause

Bitter pit is found throughout the world wherever apples are grown and has been the subject of extensive research over the past 60 years. Though there is much evidence suggesting that it is associated with marked fluctuations in availability of water to the fruit, the primary cause is not yet known. Investigation has established, however, that the following conditions and practices favour its development.

Large fruits are more susceptible than small fruits.

Bitter pit is more prevalent in the fruit of young trees and of mature trees carrying a light crop, a common occurrence in varieties of biennial-bearing habit.

Stimulation of trees into strong growth by heavy pruning or excessive use of nitrogenous fertilisers encourages bitter pit to develop.

The crop is more susceptible when there are marked fluctuations in the moisture supply during its development, as when heavy rainfall or a heavy irrigation follows a drought. Susceptibility is further increased when this occurs shortly before harvest.

Bitter pit appears to be increased by water shortage over a long period. In Hawke's Bay the incidence of pit was very high in early varieties in the 1953-54 season, when dry conditions and high temperatures prevailed from October to early March.

The picking of fruit before it has reached the correct stage of maturity is one of the main contributory factors.

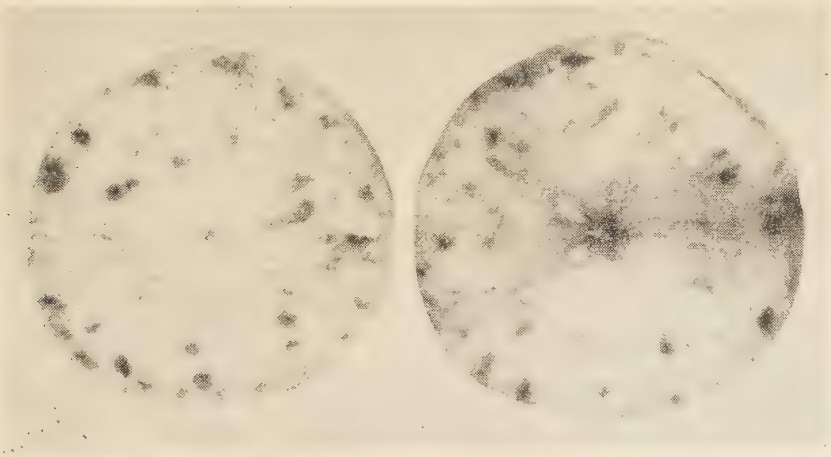


Fig. 1—Bitter pit in Cox's Orange Pippin.

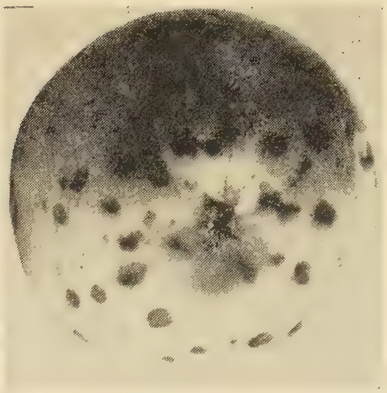


Fig. 2—Surface symptoms of bitter pit.

It follows that the incidence of bitter pit will be at its lowest under conditions of moderate tree growth, regular crops of medium-sized fruit, and a moisture supply evenly distributed throughout the season.

Recommended Practices

Though some factors are beyond control, including rainfall and the effect of frost and hail on regular cropping, correct orchard management will do much to promote the required conditions. The following practices are therefore recommended:

Pruning

Pruning should be related to the vigour of the tree, the objective being to induce only moderate growth. The pruning of young trees on vigorous rootstocks calls for special attention in this respect, as instances of unnecessarily severe treatment of trees on M. XII and M. XVI stocks have been observed by the writer. Advantage should be taken of the greater vigour of these stocks in comparison with Northern Spy, and, by lighter pruning, the trees should be allowed to attain height more rapidly and settle down to cropping. Thinning rather than shortening the lateral growth will assist in bringing the trees into heavier cropping.

Irrespective of tree age, fruiting on laterals should be encouraged, as such fruit tends to be more uniform in size than fruit borne directly on the leaders.

Manuring

As with pruning, nitrogenous fertilisers should be applied only in quantities necessary to promote moderate growth. Particular care in the use of nitrogen is required in the "off-year" of biennial cropping varieties to avoid increasing fruit size in light crops.

Biennial Bearing

The marked biennial-bearing habit of some apple varieties is largely responsible for the light crops which are so susceptible to bitter pit. As it is now known that a number of these varieties may be induced to crop regularly by chemical thinning in the "on-year" during the period extending from full bloom to petal fall, the use of chemical thinning on biennial bearers will do much to reduce bitter pit.

Irrigation

In irrigation districts water should be applied to maintain a steady development of the crop throughout the season. Heavy late irrigation when the fruit is nearing maturity is especially to be avoided.

Picking

Fruit should be picked at the correct stage of maturity. Harvesting of immature fruit is a major factor in the incidence of bitter pit. Picking young or light-crop trees should be delayed as long as possible consistent with harvesting the fruit in good condition. The crop from these trees should be kept separate from other fruit at harvest and in store and marketed as soon as possible.

Immediate storage at 32 to 34 degrees F. delays the development of bitter pit, and varieties that are not susceptible to low temperature disorders may be held under these conditions pending early disposal.

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Sheep Dog Trials

NORTH Island Sheep Dog Trial Association centre championships will be held as follows:

Northland (Otamatea D.T.C.), 13, 14, and 15 April; Waikato (Greater Hamilton S.D.T.C.), 12, 13, and 14 February; Main Trunk (Te Anga S.D.T.C.), 5, 6, and 7 March; Taranaki (Waihi-Waitara C.C.), 14, 15, and 16 May; Wanganui (Mangamahu D.T.C.), 21 and 22 April, Wairarapa and Southern Hawke's Bay (Aokautere-Linton C.C.), 10, 11, and 12 March; Hawke's Bay (Patoka S.D.T.C.), 20, 21, and 22 April; Poverty Bay (Cape Runaway D.T.C.), 20, 21, and 22 April.

Centre championships in the South Island will be held as follows:

Marlborough - Nelson (Tapawera D.T.C.), 30 and 31 March, 1 and 2 April; Canterbury (Tai Tapu C.D.C.), 13, 14, and 15 April; North Otago (Patearoa), 21, 22, and 23 May; Otago (Kuriwao), 14, 15, and 16 April; Southland (Mararoa), 29 and 30 April.

The South Island championships will be conducted by the Otago Centre at Wanaka and will begin on 25 May.

The North Island and New Zealand championships will be held at Gisborne and will begin on 8 June.

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Book Reviews

Sheep (Part 1: Sheep Husbandry): P. G. Stevens

THERE is no doubt that this book will fill a long-felt want. In the last 20 years a great deal of information on sheep husbandry has been published, but it has all been in the form of specialised articles of one kind and another, many of them in technical journals and so not readily available to students, farmers, and the public. This new book is easy to read and understand and though not lengthy, it contains much information and no useless padding.

The author, who is Senior Lecturer in Animal Husbandry at Canterbury Agricultural College, is well qualified to write a book of this type, having handled and studied sheep practically all his working life not only in New Zealand but in other parts of the world. In addition he has been able to draw on the wealth of data, some previously unpublished, which is available from an old-established agricultural college such as Lincoln. The illustrations are of a high standard and there are many useful tables and diagrams which tell the story more fully than the text alone can do.

There are 13 chapters which follow through in logical order—feeding, mating, lambing, and rearing of young sheep. Then follow shearing, dipping, and buying and selling of sheep. There is a long chapter on diseases of sheep, followed by three on various aspects of breeding, and a final chapter on beef cattle in association with sheep farming.

The author manages to inject a little dry humour into many parts of his book and refrains from unnecessary use of technical terms, thus making it very readable, and in addition he gives many useful practical hints. He is not afraid of debunking some of the common fallacies on breeding, such as the supposed superiority of high-priced rams in leaving better and more valuable fat lambs than lower-priced rams from the same breeder.

There is very little in this book about wool, but that is probably intentional, as a separate book could easily be written on this subject. The chapter on sheep diseases is necessarily highly condensed, and while the author admits that he is not a veterinarian, it is obvious that he has followed his own advice in seeking professional help in writing this section, which is a most useful summary. Probably Mr. Stevens's greatest achievement in this book is to explain concisely and clearly in three chapters the mechanism of inheritance and the history and organisation of sheep breeding in New Zealand—no mean feat in itself.

—J.E.D.

Whitcombe and Tombs Ltd., 15s. 6d.

"The Azalea Book": Frederic P. Lee

MANY books have been written on the history and culture of the true rhododendrons, but there are too few authoritative books on azaleas. This book should help to remedy the omission, as Mr Lee has a very wide knowledge of the subject and is a member of the United States Azalea Use List and Registration Authority.

Though written for the United States of America, a great deal of basic information applies to New Zealand, especially in relation to the botany of these plants. Study of the United States low temperature zones given in this book should assist in the choice of suitable azaleas for both the warmer and cooler parts of New Zealand.

Sections of the book describe culture, botany, hybridising, and origin of the various groups. The very full list of varieties should be most valuable in checking the correct names of azaleas in cultivation here. The habit of the plant and the shape of flowers are given and reference is made to the horticultural colour chart for flower colour.

One cannot wholly support the current trend to give all species of plants an English name as well as a Latin one, and in this case the author has wisely given the Latin name in such cases. Constant use of the English name does not assist in easier reading, as the accepted Latin names are well known among horticulturists.

The black and white illustrations are of a higher quality than the coloured photographs, but taken as a whole this book should prove most useful for nurserymen and gardeners who specialise in the growing and breeding of azaleas.

—J.P.S.

D. Van Nostrand Company Ltd., London, £3 7s. 6d.

◆

Importance of Minerals for Poultry

THE importance of vitamins for poultry and the deficiency disorders which may occur when not enough of these accessory food substances are present were discussed in an article in the January issue of the "Journal". In this second article J. Edmondson, Poultry Experimentalist, Department of Agriculture, Upper Hutt, discusses the essential mineral requirements of poultry and refers to disorders which occur if not enough of these minerals are present in poultry rations or if they are in unbalanced quantities.

BIRDS can excrete excesses of minerals from the body only within certain limits. Excess of one mineral will not compensate for deficiency of another. Sometimes an excess of one mineral may cause a "conditioned" deficiency of another, as where excess calcium combines with phosphorus in the gut, resulting in a deficiency of phosphorus.

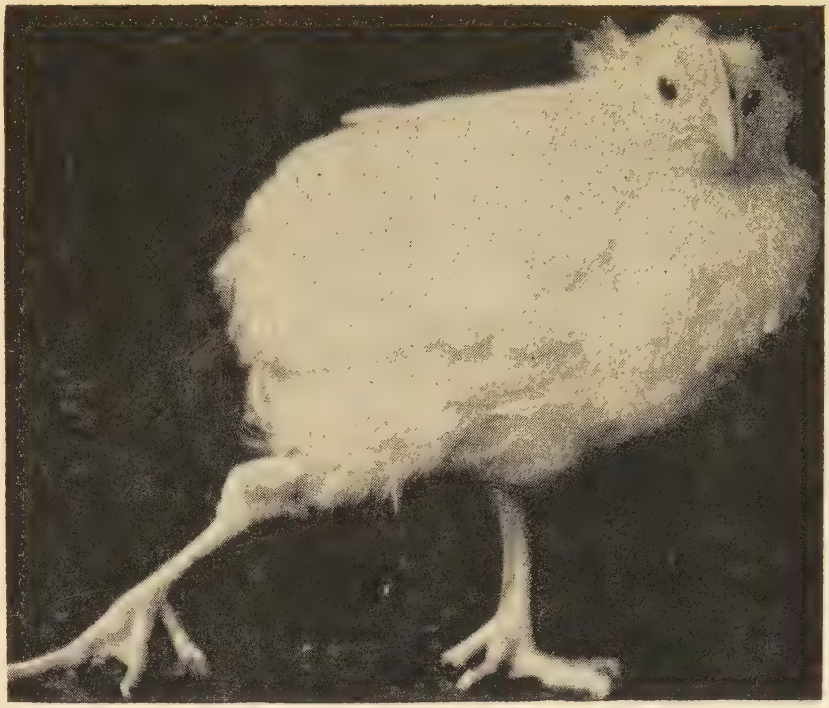
Similarly an excess of phosphorus may lead to a deficiency of manganese, which may result in perosis. These examples illustrate the necessity of a proper balance of minerals in a bird's daily food. Not only must the ration contain sufficient minerals, but they must be in the correct proportions. An excess of one mineral can often result in other mineral fractions of the diet being made unavailable to the bird.

About 12 to 15 minerals are thought to be essential for the correct functioning of the animal body. Some are required only in very minute quantities and are often termed "trace minerals" or "trace elements". The poultry farmer is concerned only with those minerals which are likely to be deficient in a ration. In rations made up of natural feeding stuffs the minerals which may be deficient are calcium, phosphorus, sodium, chlorine, and manganese.

Calcium-phosphorus Ratio

Calcium and phosphorus are so closely connected nutritionally that it is wise to consider them together. Maximum value is obtained from calcium and phosphorus only if they are correctly balanced, in proportion one to the other, and then only if there is enough vitamin D_3 in the ration. A marked excess of calcium will make phosphorus unavailable to the bird, with a detrimental effect on bone formation and eggshell strength.

An important ailment associated with a deficiency of either calcium or phosphorus is rickets. It must be remembered, however, that the same effect is produced by a deficiency of vitamin D_3.



A chick affected with perosis, or slipped tendon, a condition caused by a deficiency of manganese in the diet. The manganese shortage in the diet of these birds was a result of feeding excess phosphorus in the form of bone meal. The enlarged hock is caused by inflammation of the joint and displacement of the tendon, which slips out of the normal groove at the back of the hock joint.

The required ratio between calcium and phosphorus has a reasonable margin of flexibility. A ratio of 1½ to 2 of calcium and 1 of phosphorus is suitable for chicks. As layers require a higher proportion of calcium for eggshell production, the recommended ratio is 2½ to 3 of calcium and 1 of phosphorus.

Calcium

The most common forms of calcium supplied to poultry are oyster shell and limestone, either as a grit or ground to a powder. With normal good rations 2 per cent of ground limestone or ground oyster shell in the diet will meet the requirements of chicks and growers.

A laying bird's requirements will vary according to the number of eggs she lays; the more eggs that are laid the greater will be the quantity of calcium required to form egg shell. Probably the most reliable method of supplying supplementary calcium to layers is to include part of this in the mash as ground limestone or oyster shell and allow the bird to balance her own requirements by providing a free choice supply of oyster-shell or limestone grit.

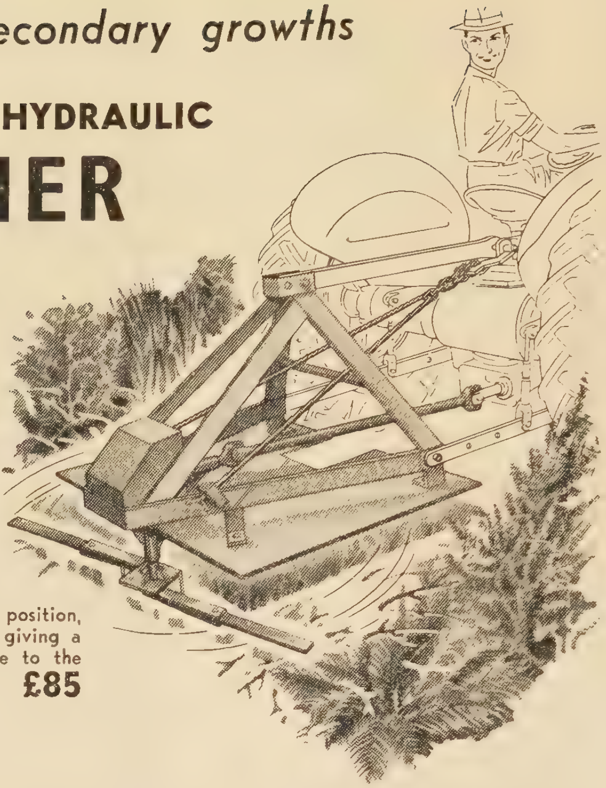
Where an all-mash ration is fed to layers, as to birds in laying cages, it is common to meet total calcium requirements by including sufficient calcium supplement in the mash. Five per cent of ground oyster shell or limestone would be sufficient. There is, however, much to be said for the system supplying part of the calcium requirements in the mash and feeding the balance as free-choice grit scattered over the mash once or twice a week. This allows layers to balance their calcium intake according to individual requirements. This method has proved of value where there has been trouble with cracks and weak shells.

A deficiency of calcium causes poor growth and rickets in young stock. In laying stock there is poor eggshell quality, lowered egg production, and decreased hatchability.

An excess will cause symptoms which are very similar to deficiency symptoms.

Clear bracken, tussocks, fern, secondary growths

WITH A WALLACE HYDRAULIC ROTARY SLASHER



Here's a really rugged implement that effectively deals with weeds, thistles, bracken, blackberry, gorse, briar, ti-tree regrowths, etc. Also recommended for topping pastures. Heavy duty angle iron frame, enclosed type gearbox featuring high tensile gears, bronze bearings and ball bearing thrust races.

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Phosphorus

Where the by-products of wheat, milk, and meat meal are used in the diet, as they are in New Zealand, there is not likely to be a deficiency of phosphorus, provided that there is a correct balance between phosphorus and calcium. Excess calcium is probably the most usual cause of phosphorus deficiency.

Excess of phosphorus causes a calcium-phosphorus imbalance and also "fixes" manganese in the diet, making it unavailable and causing perosis ("slipped tendon") and affecting eggshell quality and egg hatchability.

Manganese

Manganese is termed a "trace element" and is so called because only a minute quantity is necessary in the diet. The essential nature of manganese is reflected in the effects of a deficiency. It is necessary for high hatchability and the prevention of perosis in young stock. It also influences the building up of other essential minerals in the body, eggshell quality, and egg production.

Wheat offals are a good source of manganese, and where these form a large part of the ration a manganese supplement is not necessary. A diet containing high proportions of cereal grains either ground or whole is likely to be somewhat low in manganese. One common cause of a deficiency is the feeding of a high level of bone meal or of meat meal or meat and bone meal containing an appreciable amount of bone. The resultant boost in phosphorus increases a fowl's need for manganese.

The requirements are small and are adequately provided for by the addition of $\frac{1}{4}$ lb. of hydrated manganese sulphate to every ton of the ration. Excessive amounts can be poisonous. The difficulty of mixing such a small quantity through the food can be overcome by premixing to ensure even distribution. Common salt is a useful carrier, and 4 oz. of manganese sulphate mixed thoroughly with 10 lb. of salt can be used at $\frac{1}{2}$ per cent of the total diet.

Chlorine and Sodium

Evidence supports the advisability of supplementing the ration with chlorine and sodium. The addition of common salt meets the requirements of poultry for sodium and chlorine. There is considerable disagreement on the optimum level of salt to use and this will depend to some extent on the salt content of ingredients normally present in the diet. However, generally $\frac{1}{2}$ per cent is used and is satisfactory. If fish meal constitutes 10 per cent of the ration, no added salt is necessary.

Toxic effects such as mortality and decreased growth due to excessive salt are not normally met with on levels of less than 3 per cent in the total diet. It is essential to ensure an even distribution through the mash. Excess salt increases potassium requirements, and as salt metabolism is related to water balance, an excess will cause wet droppings, resulting in the problem of wet litter.

Poultry Grit

Some confusion is sometimes brought to light concerning the term poultry grit and its use to describe two very different substances. Poultry grit can be divided into two categories:

Soluble grits contain a high proportion of calcium. Limestone grit, oyster-shell grit, and cockle-shell grit are examples of soluble grits and these are included in the ration expressly to supply additional calcium to the bird. The value of such grit as a grinding agent in the gizzard is practically nil, as it becomes completely dissolved by the gastric juices in the gizzard in less than 48 hours.

Insoluble grits such as granite, flint, ordinary stones, pebbles, and coarse sand perform an important function in poultry nutrition. Insoluble grit, usually referred to as "metal grit" in New Zealand, acts in the gizzard as a grinding and crushing agent, reducing large particles of food and separating fine particles so that the digestive juices can penetrate and work efficiently. This results in more efficient and more economic utilisation of food. There is also evidence to prove that the presence of insoluble grit in the gizzard helps to "tone up" the digestive organs and digestive processes generally. The gizzard is constructed of particularly powerful muscles to carry out this grinding process and has a leathery type of lining which is uninjured by sharp material such as irregularly shaped hard grit.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given in March as follows:

1YA Auckland, 7.45 p.m.

4 March—"Crickets", by G. L. Banfield, Instructor in Agriculture, Department of Agriculture, Thames.

11 March—"Autumn Livestock Problems", by G. Wallace, Veterinarian, Department of Agriculture, Auckland.

18 March—"Grass-grub", by J. E. Bell, Fields Superintendent, Department of Agriculture, Auckland.

25 March—"Brucellosis in Animals", by A. Fisher, Veterinarian, Department of Agriculture, Papakura.

1XH Hamilton, 12.33 p.m.

9 March—"Control of Internal Parasites in Sheep", by D. Bilkey, Livestock Instructor, Department of Agriculture, Hamilton.

16 March—"Some Standards of Efficiency for Hill Country Improvement", by J. D. Currie, Instructor in Agriculture, and J. M. Miller, Field Economist, Department of Agriculture, Hamilton.

23 March—"Weed Control", by F. B. Thompson, Principal Scientific Officer, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

11 March—Young Farmers' Clubs, by Western Bay of Plenty district committee.

25 March—"Care of the Farm Dog", by M. B. Mackenzie, Livestock Instructor, Department of Agriculture, Tauranga.

3YA Christchurch, 12.20 p.m.

16 March—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

2 March—"Grass-grub Control", by J. G. Richards, Instructor in Agriculture, Department of Agriculture, Oamaru.

9 March—"Flock Replacements", by A. W. J. Apps, Livestock Instructor, Department of Agriculture, Palmerston.

16 March—"Dipping", by K. G. Gray, Livestock Instructor, Department of Agriculture, Invercargill.

23 March—"Experimental Work at Middome", by W. O. Sly, Soil Conservator, Department of Agriculture, Invercargill.

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m.

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m., Thursdays at 12.33 p.m.

2XA Wanganui, Wednesdays at 8 p.m. (stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

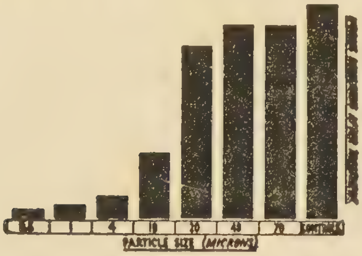
4YA Dunedin, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m. and 6.50 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m. and 7.15 p.m. (Lorneville and Gore stock market reports), Wednesdays at 12.33 p.m., Thursdays at 12.33 p.m.

TARTAN

topics

phenothiazine



This is a reproduction of a graph produced by the Animal Research Station, Wallaceville, to illustrate the efficiency of fine particle phenothiazine against worms in sheep.

TARTAN FENODREN liquid has a median or average particle size by weight of 3 microns (1/8000th of an inch!), and the above graph shows the high order of efficiency of phenothiazine within this size range.

When you get down to comparing these fine sizes, a microscope is necessary to compare the degree of fineness. However, the following diagram shows the particle size of some everyday materials on the same scale as typical particles of TARTAN FENODREN. For example, flour, fine by normal standards, has a particle size which would not be classed as a satisfactory average in an efficient phenothiazine product.

A: Particle of typical flour. *B:* Particle of face powder. *C, D & E:* Typical size range of Tartan Fenodren particles.

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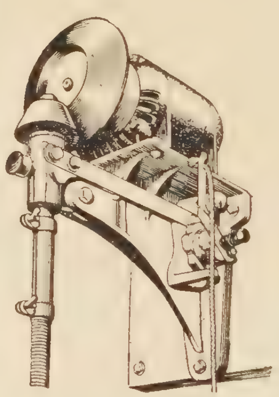

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Care of Bee Combs

Seasonal Notes for the Domestic Beekeeper

By D. A. BRISCOE,
Apiary Instructor,
Department of Agriculture,
Tauranga

THE present cost of replacing beekeeping material is high and all efforts should be made to ensure that it has as long a useful life as is possible. Modern timber preservatives and an occasional coat of paint will lengthen the useful life of apiary woodware. However, of greater importance than the care of supers, lids, bottom boards, etc., is the maintenance of a stock of good bee combs.

HONEY-EXTRACTING combs are the beekeeper's most valuable asset apart from his bees, and special care should be taken to protect them from damage or deterioration when they are not in use on the hives.

Replace Damaged Combs

During the early seasonal examination of hives all old or damaged combs should be replaced with good worker combs or with frames fitted with full sheets of wax foundation. If this practice is followed consistently, a good stock of first-class combs can be built up.

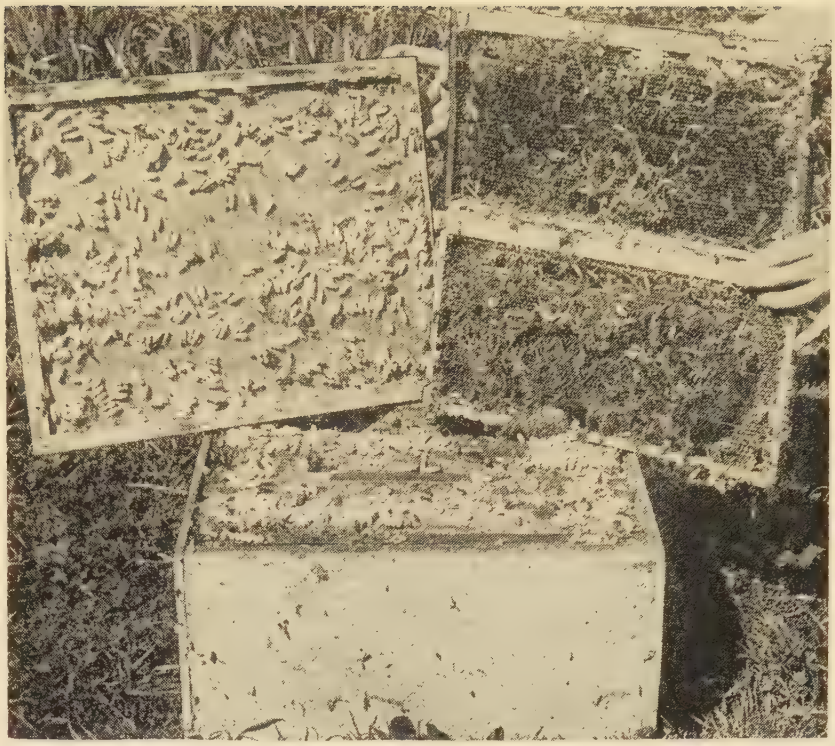
At the end of the season honey-extracting combs that are surplus to hive wintering requirements have to be put aside carefully to protect them from damage or deterioration.

Common factors which contribute to loss or damage of combs are mice, mould, and wax moth infestation.

Wax Moth Damage

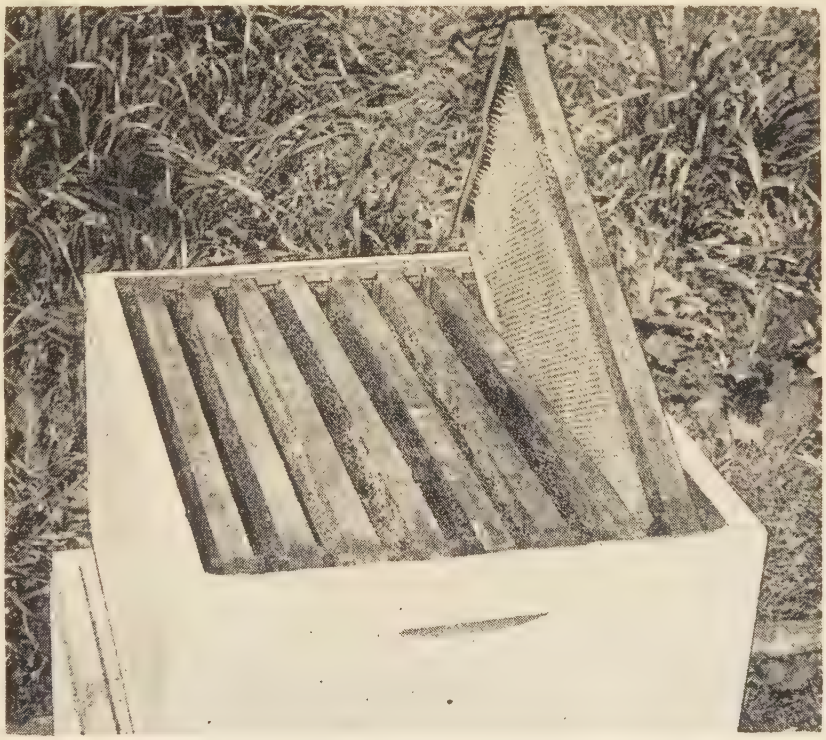
In warm districts where wax moths are prevalent they cause a considerable amount of damage to combs each year. There are two species of wax moth, the greater (*Galleria mellonella*) and the lesser (*Achroia grisella*).

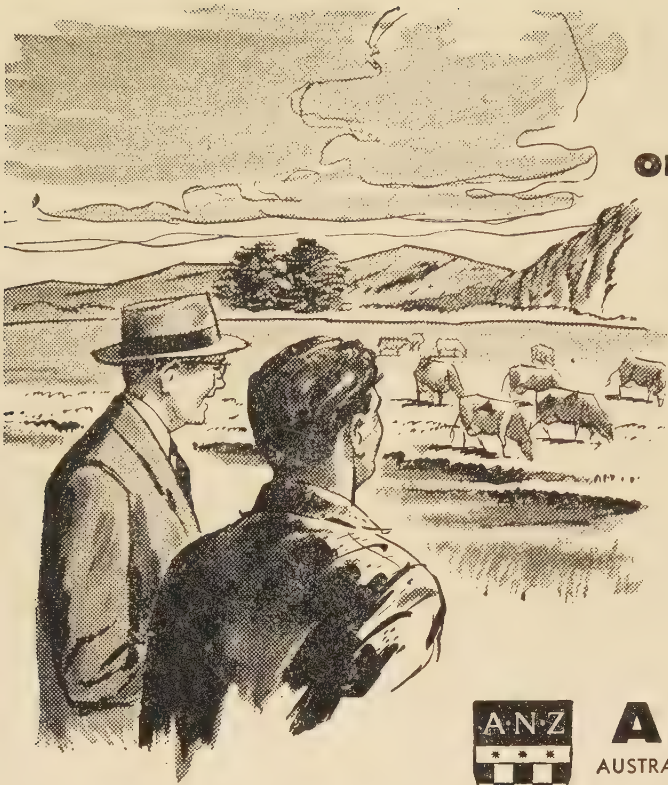
The larvae of these moths live on pollen and the remains of brood rearing in the cells of brood and pollen combs. Larvae of the larger wax moth are much more destructive to the combs than are those of the smaller species. They riddle the combs under the protection of strong silken webs which they spin round themselves while eating their way forward in search of food. Bee combs so attacked are soon destroyed.



Extensive damage caused by wax moth infestation, showing cocoons and the webbing of the silken tunnels on the bee combs. The result has been the loss of all combs.

▼ A super containing eight well spread combs. This arrangement allows cool air to circulate more freely around all the combs and restricts the hatching of wax moth eggs.





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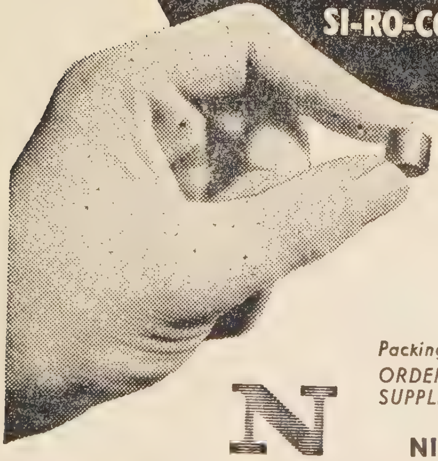

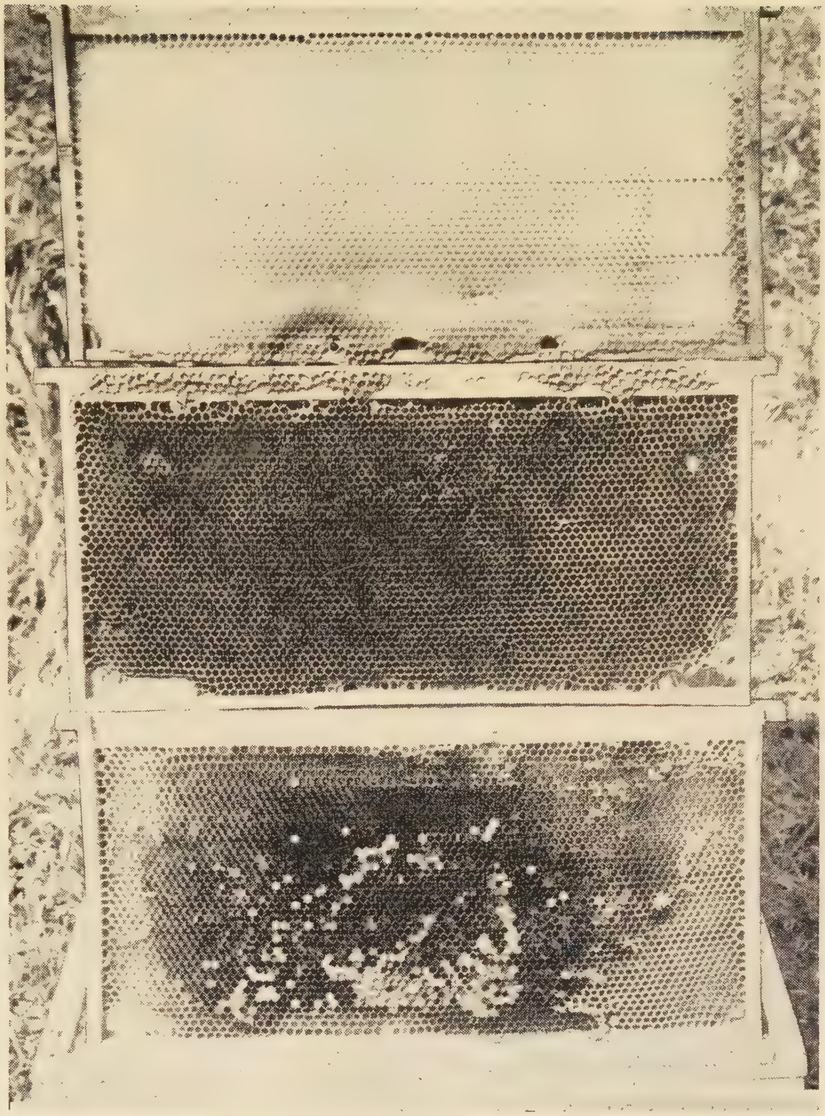

The sorting of bee combs before they are stored is essential. Top—A new or virgin comb. Middle—A brood comb. Bottom—A comb containing pollen and the remains of brood-rearing material.

Control of Wax Moth

This pest can be controlled if one or two simple precautions are taken. First, before the supers of combs are stored away it is wise to sort the combs into separate groups. Combs containing pollen are placed into one group, empty brood combs into a second, and "new" or virgin combs into a third group. Owing to the feeding habits of wax moths the sorting of combs in this manner will reduce risk of serious loss of combs by their depredations. Secondly, reducing the number of combs to eight in each super and spacing them evenly will prevent the inside air temperature building up to the usual extent, with the result that hatching of any wax moth eggs present will be restricted. As low temperature plays a big part in controlling the hatching of wax moth eggs, a cool, dry, and airy place is ideal for storing bee combs.

Fumigants

Should wax moths become troublesome, particularly in warm areas, it will be necessary to use some method of fumigant control. Several substances can be used to control this pest, but care is necessary with their use.

Calcium cyanide is one of the most efficient fumigants for control of wax moths; it can be obtained in coarse crystal or powder form.

If a building that can be closed for periodic fumigation is available and it is desired to fumigate bee combs already affected, the supers in which they are stored may be placed criss-cross in tiers and calcium cyanide placed about the room on sheets of newspaper.

The active agent of calcium cyanide is liberated as hydrocyanic acid gas, which is extremely poisonous to humans and all animal life. Therefore caution is necessary when this chemical is used.

The operator should leave the building as soon as possible and tightly close all windows and doors for at least 24 hours. Before the building is re-entered a free circulation of air should be allowed through wide open doors and windows for a long period during daylight. During this airing precautions should be taken to prevent anyone unaware of the presence of the gas entering the premises.

Supers and combs stored outside or in open sheds can be fumigated by piling the supers in neatly fitting stacks on floorboards and by covering each stack with a hive lid. A level dessertspoon of calcium cyanide placed on paper and inserted underneath the combs in the bottom super will be sufficient for a stack of six supers. The entrance to each stack should be closed with some kind of material or a wooden block immediately the gas has been applied.

As this gas is not effective against the eggs of wax moth, treatment of infected combs should be repeated in this way in about 3 weeks and thereafter when necessary.

Carbon bisulphide is also effective as a fumigant against wax moth. This chemical is sold in liquid form. To secure the highest efficiency in fumigating combs already infected with wax moth a cloth should be saturated with at least two tablespoons of this chemical to every five supers of combs. The cloth is then placed in a shallow receptacle on top of each stack under a close-fitting lid. A light pad of newspaper placed beneath each stack will help confine the gas, which being heavier than air gradually filters down through the bee combs, killing any grubs or moths present.

Carbon bisulphide should be handled with care, as the gas is poisonous to humans and is highly explosive.

When fumigation is done in a closed building all windows and doors should be opened for a few hours before the building is re-entered and precautions should be taken to prevent entrance of the unwary.

Where only a few supers of combs require fumigating sulphur dioxide (burning sulphur) is quite satisfactory.

All photographs by Rendell.

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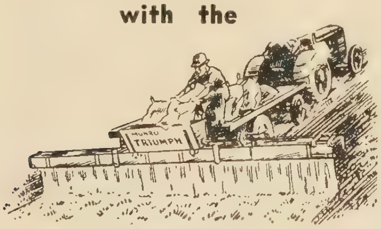
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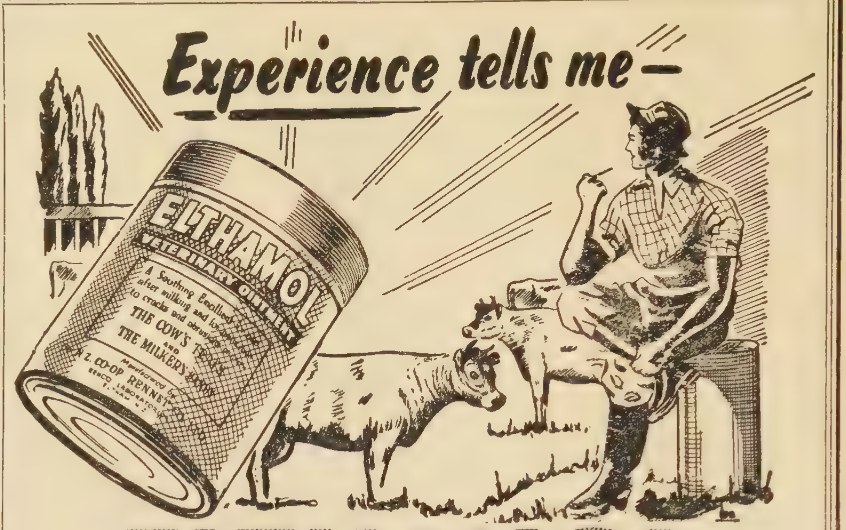
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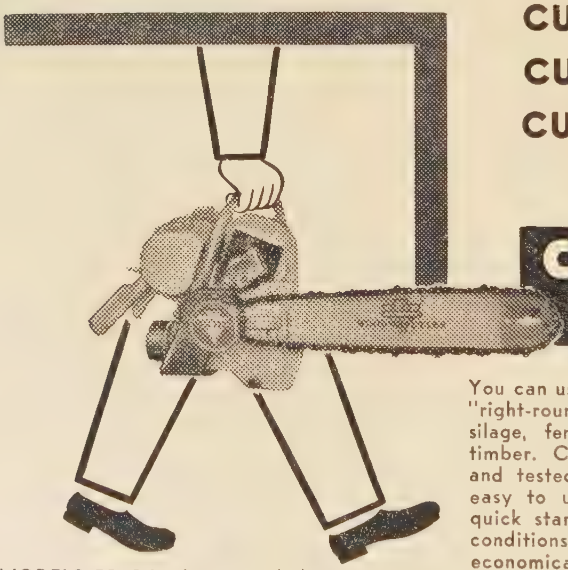

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Lambing Estimates for 1958 Season

A Dominion lambing percentage exceeding 100 was recorded in the 1958 season, the first time that this figure has been reached. As the total of breeding ewes was also a record at 30,877,548, the total number of lambs born, 31,039,081 is substantially higher than from any previous lambing. The record land district lambing was again recorded in Southland with 112.4 per cent. The South Island percentage was 106.32 and the North Island 95.43.

Totals for counties, districts, and the Dominion are set out in the following tables, which have been contributed by the Animal Industry Division of the Department of Agriculture.

NORTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	44,651	87.85	39,226
Whangaroa	19,394	93.43	18,120
Hokianga	53,483	86.48	46,252
Bay of Islands	122,737	93.67	114,968
Whangarei	152,983	88.32	135,115
Hobson	158,203	89.34	141,339
Otamatea	149,504	91.40	136,647
Rodney	187,524	89.24	167,346
Waitemata	131,242	93.93	123,276
Great Barrier Island	4,897	62.84	3,077
Manukau	109,786	90.34	99,181
Franklin	218,215	94.69	206,628
Totals	1,352,619	91.02	1,231,175

SOUTH AUCKLAND LAND DISTRICT

Raglan	637,300	92.87	591,861
Waikato	294,708	99.97	294,620
Waipa	263,399	101.47	267,271
Otorohanga	307,106	96.64	296,787
Waitomo	565,842	91.86	519,782
Taumarunui	460,216	96.53	444,247
Coromandel	45,698	88.25	40,328
Thames	18,727	87.25	16,339
Hauraki Plains	35,749	86.65	30,977
Ohinemuri	56,446	87.95	49,644
Piako	177,294	97.53	172,915
Matamata	452,351	102.97	465,786
Tauranga	240,015	96.92	232,623
Rotorua	303,490	94.49	286,768
Taupo	138,910	92.83	128,950
Whakatane	94,408	91.08	85,987
Totals	4,091,659	95.92	3,924,885

TARANAKI LAND DISTRICT

Clifton	118,841	92.60	110,047
Taranaki	50,270	98.69	49,611
Inglewood	86,698	99.49	86,256
Egmont	44,619	98.11	43,776
Stratford	237,960	94.34	224,491
Eltham	75,068	101.17	75,946
Waimate West	10,911	109.97	11,999
Hawera	104,089	97.12	101,091
Totals	728,456	96.54	703,217

HAWKE'S BAY LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Wairoa	433,573	86.59	375,431
Hawke's Bay	1,159,786	97.98	1,136,358
Waipawa	530,781	102.84	545,855
Waipukurau	184,125	100.20	184,493
Patangata	625,496	93.87	587,153
Dannevirke	494,714	107.28	530,729
Woodville	125,746	100.03	125,784
Totals	3,554,221	98.08	3,485,803

GISBORNE LAND DISTRICT

Opotiki	66,796	77.05	51,466
Matakaoa	67,651	85.59	57,902
Waiapu	254,360	81.77	207,990
Uawa	110,258	83.99	92,606
Waikohu	373,217	85.46	318,951
Cook	489,815	82.90	406,057
Totals	1,362,097	83.33	1,134,972

WELLINGTON LAND DISTRICT

Patea	265,206	99.26	263,243
Waimarino	227,997	98.85	225,375
Waitotara	176,599	94.82	167,451
Wanganui	325,646	92.17	300,148
Rangitikei	1,117,411	94.39	1,054,724
Kiwitea	332,266	101.16	336,120
Pohangina	170,599	115.88	197,690
Oroua	307,690	110.97	341,444
Manawatu	201,226	109.02	219,377
Kairanga	135,575	102.50	138,964
Horowhenua	157,047	99.00	155,477
Hutt	81,784	95.72	78,284
Makara	57,527	83.68	48,139
Pahiatua	205,484	96.94	199,196
Akitio	168,279	87.44	147,143
Eketahuna	176,873	91.66	162,122
Mauriceville	61,652	94.09	58,008
Masterton (includes Castlepoint)	475,516	90.98	432,624
Wairarapa South	243,082	99.18	241,089
Featherston	395,465	97.79	386,725
Chatham Islands (provisional)	51,000	75.00	38,250
Totals	5,333,924	97.33	5,191,593

MARLBOROUGH LAND DISTRICT

Sounds	82,005	75.20	61,668
Marlborough	342,685	97.00	332,404
Awatere	212,179	91.10	193,295
Kaikoura	146,632	80.30	117,745
Totals	783,501	90.00	705,112

LAMBING ESTIMATES . . .

NELSON LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Waimea	218,967	95.60	209,332
Golden Bay	47,377	93.20	44,155
Buller	3,235	93.10	3,012
Murchison	39,083	88.50	34,588
Inangahua	29,019	91.50	26,552
Totals	337,681	94.06	317,639

WESTLAND LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Grey	44,703	104.30	46,625
Westland	51,374	100.20	51,477
Totals	96,077	102.11	98,102

CANTERBURY LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Amuri	286,708	88.40	253,450
Cheviot	186,032	103.90	193,287
Waipara	398,556	107.00	426,455
Kowai	126,969	115.00	146,014
Ashley	87,356	99.00	86,482
Rangiora	89,576	111.90	100,236
Eyre	101,559	111.40	113,137
Oxford	124,859	107.70	134,473
Tawera	59,753	85.70	51,208
Malvern	255,031	106.50	271,608
Paparua	83,384	106.10	88,470
Waimairi	4,562	102.30	4,667
Heathcote	9,850	97.10	9,564
Halswell	24,257	108.50	26,319
Mt. Herbert	41,475	104.30	43,258
Akaroa	96,960	108.00	104,717
Wairewa	77,720	100.30	77,953
Springs	60,183	109.80	66,081
Ellesmere	132,996	116.90	155,472
Selwyn	215,707	101.90	219,805
Ashburton	1,392,328	106.20	1,478,652
Geraldine	407,599	107.00	436,131
Levels	317,976	111.90	355,815
Mackenzie	369,322	91.00	336,083
Waimate	736,422	111.40	820,374
Totals	5,687,140	105.50	5,999,711

OTAGO LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Waitaki	670,569	112.30	753,049
Waihemo	148,748	114.00	169,573
Waikouaiti	105,099	102.00	107,201
Peninsula	26,741	115.60	30,913
Taieri	235,903	96.30	227,175
Bruce	372,392	109.50	407,769
Clutha	759,420	110.00	835,362
Tuapeka	512,164	104.00	532,651
Maniototo	316,799	112.20	355,448
Vincent	331,342	94.00	311,461
Lake	169,323	83.30	141,046
Totals	3,648,500	106.12	3,871,648

SOUTHLAND LAND DISTRICT

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
Southland	2,956,245	114.20	3,376,032
Wallace	943,400	105.80	998,117
Stewart Island ..	2,028	53.00	1,075
Totals	3,901,673	112.14	4,375,224

DISTRICT ESTIMATES

County	Breeding ewes (as at 1958)	Estimated percentage of lambs	Estimated number of lambs
North Auckland ..	1,352,619	91.02	1,231,175
South Auckland ..	4,091,659	95.92	3,924,885
Gisborne	1,362,097	83.33	1,134,972
Hawke's Bay ..	3,554,221	98.08	3,485,803
Taranaki	728,456	96.54	703,217
Wellington	5,333,924	97.33	5,191,593
Marlborough ..	783,501	90.00	705,112
Nelson	337,681	94.06	317,639
Westland	96,077	102.11	98,102
Canterbury	5,687,140	105.50	5,999,711
Otago	3,648,500	106.12	3,871,648
Southland	3,901,673	112.14	4,375,224
Totals	30,877,548	100.52	31,039,081

Some of the above figures for breeding ewes have been adjusted to the nearest 100, where an estimated figure only was available.

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for 1958 and the previous 5 years and the number of lambs tailed for the seasons up to 1956.

Year	Number of breeding ewes	Estimated percentage of lambs	Estimated number of lambs	Actual number of lambs tailed
NORTH ISLAND				
1958 ..	16,422,976	95.43	15,671,645	—
1957 ..	15,485,399	90.86	14,070,262	—
1956 ..	14,611,500	89.16	13,026,961	12,899,166
1955 ..	14,103,936	87.38	12,323,682	12,325,564
1954 ..	13,529,687	89.63	12,126,101	12,444,533
1953 ..	13,097,679	96.24	12,605,517	12,836,745
SOUTH ISLAND				
1958 ..	14,454,572	106.32	15,367,436	—
1957 ..	13,411,146	104.09	13,959,122	—
1956 ..	12,311,700	100.37	12,356,739	12,597,109
1955 ..	12,082,422	103.46	12,500,215	12,595,900
1954 ..	11,320,843	103.01	11,662,121	11,794,656
1953 ..	10,683,697	98.52	10,526,302	10,758,060
DOMINION				
1958 ..	30,877,548	100.52	31,039,081	—
1957 ..	28,896,545	97.00	28,029,384	—
1956 ..	26,923,200	94.28	25,383,700	25,496,275
1955 ..	26,186,358	94.80	24,823,897	24,921,464
1954 ..	24,850,530	95.73	23,788,222	24,239,189
1953 ..	23,781,376	97.27	23,131,819	23,594,805

[*Sparrow*

Statistician's Assessment of

THE MARKET FOR WOOL

Production Should Keep Pace with Growing World Demand

WOOL producers can retain their share of the market for wool-type fibres only if the world is well supplied with wool is the conclusion drawn by B. P. PHILPOTT, Statistician, New Zealand Meat and Wool Boards' Economic Service*, in this article. There should be no fear of oversupplying the market; in fact oversupply occasionally may be a good thing. The main concern should be to see that wool production is increased enough to meet the steady growth in world demand. This would be the best insurance against the competition of synthetics.

WE can obtain a much clearer understanding of what is happening in the wool market at present and what is likely to happen if we look first at what happened in the past. Not only does this help to get the current situation into perspective, but it is essential if we are to analyse and understand fully the factors which influence wool prices. But before turning to such an analysis, it is useful to go over some recent statistics relating to world wool production, consumption, and trade, from which can be gained an idea of the very complex nature of the structure of the world wool market and of the flow of wool from the producer to the final consumer of wool textiles.

Structure of World Wool Trade

The statistics of world wool supplies, mill consumption, wool textile trade, and wool textile consumption for 1934-38 (average) and for some of the post-war years are given in Tables 1 to 5.

Table 1 gives the world supplies of raw wool, consisting of production from the main wool-producing countries and from the rest of the world and the quantity of wool sold each year from stockpiles. Supplies of wool from stockpiles were most important

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* Mr Philpott wrote this article when a member of the Meat and Wool Boards' Economic Service staff. He is now Professor of Agricultural Economics at Canterbury Agricultural College.

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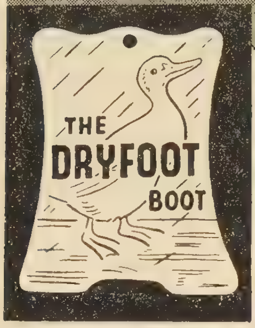

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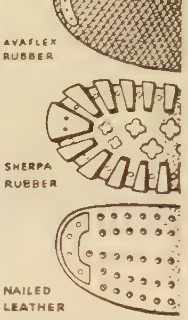

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TABLE I—WORLD SUPPLIES OF RAW WOOL (SELECTED YEARS)*

	Av. of 1934-38	1948-49	1949-50	1950-51	1955-56	1956-57	1957-58
			million lb. greasy				
1. Production in main countries:							
Australia	995	1,057	1,142	1,118	1,410	1,565	1,463
New Zealand	300	367	390	390	462	491	496
Argentina	376	425	415	419	390	388	409
South Africa	261	227	225	245	314	321	320
United States	470	311	273	271	305	307	292
Uruguay	114	144	163	185	195	190	200
United Kingdom	110	81	88	91	102	105	112
Rest of Western Europe ..	213	251	238	237	251	249	246
Total group 1	2,839	2,863	2,934	2,956	3,429	3,616	3,538
			million lb. clean				
Clean equivalent ..	1,491	1,627	1,679	1,711	1,953	2,060	2,015
2. Supplies from stockpiles, J.O., etc.	—	288	271	53	21	53	50
3. Total supplies from main countries	1,491	1,915	1,950	1,764	1,974	2,113	2,065
4. Production in other countries	533	536	544	596	819	871	889
Total world supplies ..	2,024	2,451	2,494	2,360	2,793	2,984	2,954

* Calculations based on statistics in "Wool Intelligence", issued by the Commonwealth Economic Committee.

in the immediate post-war period, up to 1951, during which the accumulated stocks of J.O.* wool were sold.

Before supplies reach the final consumer of wool textiles the wool must go through the manufacturing stage in the mills. Table 2 gives the figures of mill consumption divided into:

(i) Countries both consuming and exporting raw wool.

(ii) Countries consuming mainly imported wool.

(iii) Countries consuming mainly domestically produced wool.

Total mill consumption of the first two groups runs very close to the total supplies (including stockpiles) from the main producers as in Table 1. World trade in raw wool is, therefore, confined to a group of fairly advanced countries consisting of Australia, New Zealand, Argentina, South Africa, the U.S.A., Canada, Japan, and Western Europe. Broadly, the rest of the world consumes only what wool it produces.

A different picture emerges in the next stage in the process, the trade in tops, yarn, cloth, and other items of wool manufacture. The structure of this trade for 1956 is shown in Table 3. Here, the major raw wool consuming countries are in two groups, those which are net exporters of wool textiles and those which are net importers. In 1956 the former group (7 countries) consumed 1,239 million lb. (clean) of raw wool in the mills, but of this, the equivalent of 482 million lb. of wool was exported to the rest of the world in the form of wool textiles, leaving 757 million lb. to be consumed at home.

Table 4 gives the figures (calculated as in Table 3) of total wool textiles available for home use, the countries being grouped as in Table 2. A feature is the rise in the total world consumption of wool textiles up to 1950, then a falling away, and a rise again to a much higher point by 1956. These changes in wool textile consumption reflect the similar changes in the supply of wool, noted in Table 1, resulting mainly from the effect of the sale of J.O. stockpile wool from 1946 to 1950.

Changes in the level of world consumption of wool textiles are of course a result of changes in populations and changes in consumption per head. Figures of consumption of wool textiles per head adapted from Table 4 are given in Table 5, from which emerges the startling conclusion that wool textile consumption per head after rising somewhat in the post-war period up to 1950 is in many countries now back to about the pre-war level. The increase in supplies of wool compared with the pre-war years has, it appears, been sufficient only to barely keep pace with population increases, in spite of a rapid increase in production in the main producing countries since 1951.

Factors Affecting General Trend of Wool Prices

There are very large differences in consumption of wool textiles per head in various countries, related to some

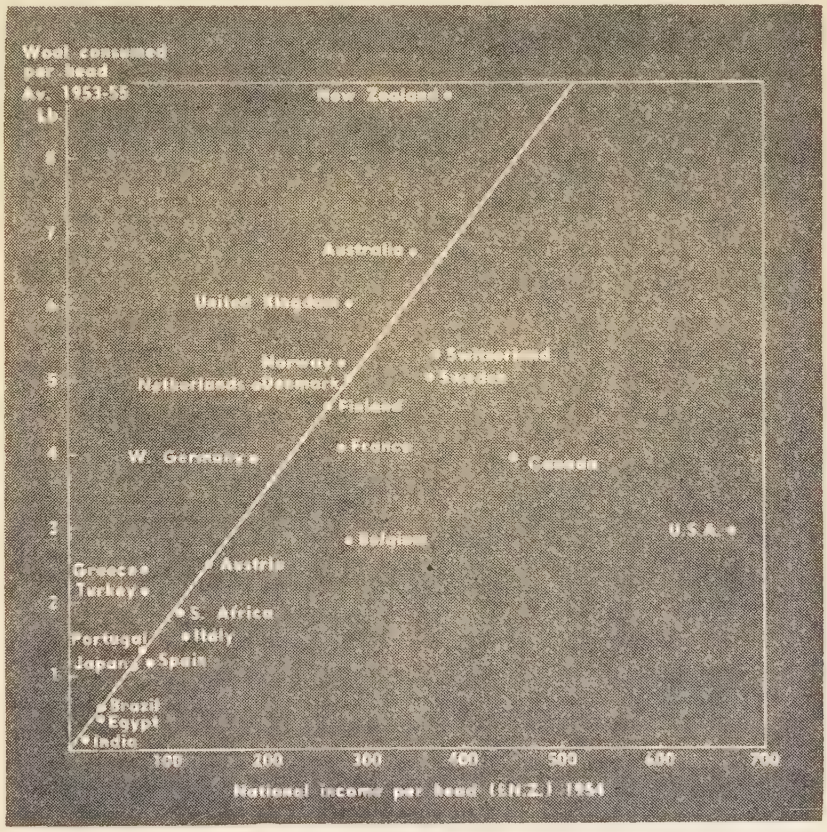

Diagram I—International comparison of wool consumed per head and national income per head.

(Sources: "World Wool Digest" and "U.N. Monthly Bulletin of Statistics".)

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* Joint Organization, the popular name given to the United Kingdom-Dominion Wool Disposal Ltd., a private registered company set up after the Second World War to handle the marketing of old wool and to fix floor prices until this wool was cleared. The stockholders were the Governments of the United Kingdom, Australia, South Africa, and New Zealand.

TABLE 2—WORLD MILL CONSUMPTION OF WOOL*

	1938	1948	1950	1952	1954	1956	1957
			million lb. clean				
1. Main wool exporting countries:							
Australia	42	77	61	45	56	65	69
Argentina	33	59	75	65	60	64	65
Uruguay	2	9	11	30	37	50	40
South Africa	1	9	7	18	17	15	17
New Zealand	4	7	7	7	8	7	7
Total group 1	82	161	161	165	178	201	198
2. Countries consuming mainly imported wool:							
United Kingdom	441	483	518	379	462	475	481
U.S.A.	284	705	646	475	350	403	342
France	257	256	254	214	256	277	299
German Federal Republic ..	198	46	128	132	152	176	181
Japan	88	10	51	99	110	171	188
Italy	51	137	126	125	119	124	161
Belgium	55	66	79	57	63	78	80
Canada	20	39	32	27	20	22	22
Sweden	11	28	22	13	12	11	11
Netherlands	11	39	37	26	25	28	26
Rest of Western Europe ..	100	144	158	115	126	142	142
Total group 2	1,516	1,953	2,051	1,662	1,695	1,907	1,933
Total of groups 1 and 2 ..	1,598	2,114	2,212	1,827	1,873	2,108	2,131
3. Countries mainly consuming domestically produced wool:							
Eastern Europe and U.S.S.R. ..	339	245	271	298	441	496	N.A.
Rest of South America ..	37	42	51	75	75	63	N.A.
Rest of Asia	95	112	112	121	154	162	N.A.
Rest of Africa	12	22	22	26	25	22	N.A.
Total group 3	483	421	456	520	695	743	760
World total	2,081	2,535	2,668	2,347	2,568	2,851	2,891

---

* Adapted from statistics in "Wool Intelligence", issued by the Commonwealth Economic Committee.
N.A., not available.

extent to climate, preferences, and habits (notably in the U.S.A.), but mainly to differences in per capita incomes. This is demonstrated by Diagram 1, in which wool textile consumption per head in some countries in 1953-55 is plotted against national income per head for each country in 1954.

Broadly it appears that countries with high living standards have a large per head wool consumption and vice versa (the special influences such as central heating, etc., which operate in the United States and Canada and which tend to lower their wool consumption stand out clearly in this diagram). This relationship between per capita incomes and per capita wool textile consumption has been the subject of many careful statistical studies for individual countries. These all show that per capita incomes influence strongly the demand for wool textiles with the proviso that at high levels of per capita income, such as in the United States, the United Kingdom, and New Zealand, a smaller proportion of any increase in income is spent on wool textiles than at lower levels of income.

TABLE 3—STRUCTURE OF WOOL TEXTILE TRADE 1956*

	Net Exporters of Wool Textiles		
	Mill consumption of wool	Less total exports of wool textiles	Equals home consumption of wool textiles
	(million lb. clean equivalent wool content)		
United Kingdom	475	—173	302
Italy	124	—92	32
France	277	—87	190
Belgium	78	—57	21
Argentina	64	—1	63
Japan	171	—17	154
Uruguay	50	—35	15
Errors and omissions ..	—	—20	—20
	1,239	—482	757
	Net Importers of Wool Textiles		
	Mill consumption of wool	Plus total net imports of wool textiles	Equals home consumption of wool textiles
	(million lb. clean equivalent wool content)		
Western Germany ..	176	+75	251
Netherlands	28	+40	68
Sweden	11	+25	36
Rest of Western Europe ..	142	+88	230
U.S.A.	403	+51	454
Canada	22	+41	63
Australia	65	+9	74
New Zealand	7	+9	16
South Africa	15	+8	23
Rest of South America ..	63	+16	79
Rest of Asia	162	+61	226
Rest of Africa	22	+25	47
Eastern Europe and U.S.S.R.	496	+31	527
	1,612	+482	2,094
World total	2,851		2,851

---

* Adapted from statistics in "Wool Intelligence", issued by the Commonwealth Economic Committee.

Increases in world—or at any rate that part of the world consisting of the main consuming countries in groups 1 and 2 of Table 4—**demand** for wool textiles over any given period, whether they arise from increased population or increased real incomes, can be satisfied only if there is an equivalent and simultaneous increase in the supply of wool. If wool supply did not increase, the only effect of people's desire to consume more wool textiles would be to raise eventually the price of wool as a result of demand exceeding supply. If, however, wool supply increased more than in proportion to an increase in demand, wool prices eventually would fall. These long-term reactions take time to work themselves out, and often the real impact on wool prices of changes in the demand for wool textiles and in the supply of raw wool is for a while disguised by short-term fluctuations, sometimes considerable, in prices. These arise from the complex and diverse nature of the process by which raw wool flows to final consumers and are described later in this article.

For the purposes of the analysis which follows it is preferable therefore to smooth out these inter-seasonal fluctuations by taking 3-year moving averages of wool prices, thus giving an indication of the general long-term trend in prices. Account must also be taken of world-wide changes in the value of money as evidenced by changes in the **general price level** both here and overseas. In so far as wool prices change to the same extent as all other prices, wool producers are no better off, nor any worse off. What is of interest, and of importance, is the change in wool prices **relative to changes in the general price level**, that is, changes in the wool producers' terms of trade.

The general trend of the index of wool prices divided by an index of the general overseas price level for the last 35 years is shown in Diagram 2. This diagram also shows, as index numbers, the world per capita supply of wool and the level of world per capita industrial production. The latter is used as an indicator of changes in world per capita real incomes. There are no adequate statistics of real income in many of the important wool consuming countries and the level of industrial production is used instead, because it is known that in most of the countries with which we are dealing, changes in income and changes in industrial production are very closely connected.

Diagram 2 gives a very good, if broad, picture of the interaction of demand, supply, and price of wool

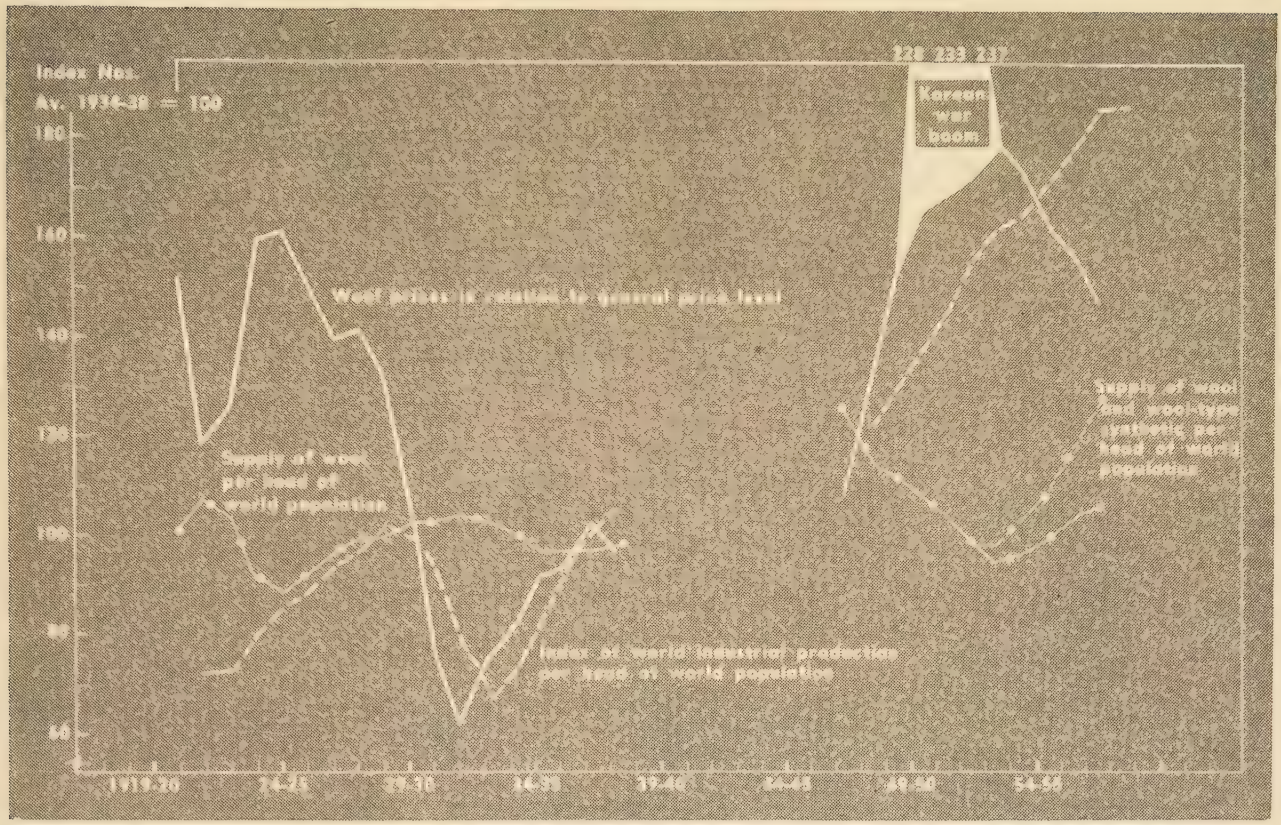

Diagram 2—Wool prices, wool supply, and industrial production per head of world population (3-year moving averages of index numbers).

TABLE 4—WOOL TEXTILES AVAILABLE FOR HOME USE*

	1938	1948	1950	1952	1954	1956	1957
	million lb. clean equivalent wool content						
1. Main wool exporting countries:							
Australia	52	83	83	64	68	74	N.A.
Argentina	67	67	75	63	58	63	N.A.
Uruguay	3	9	7	12	11	15	N.A.
South Africa	11	22	15	20	25	24	N.A.
New Zealand	11	15	21	20	20	16	N.A.
Total group 1	144	196	201	179	182	192	
2. Countries consuming mainly imported wool:							
United Kingdom	332	315	330	231	297	302	310
U.S.A.	290	719	680	528	379	454	363
France	175	191	156	151	173	190	207
German Federal Republic ..	200	41	158	155	193	252	280
Japan	62	8	48	107	97	153	168
Italy	20	119	96	106	70	32	50
Belgium	34	41	42	35	27	21	23
Canada	43	81	68	52	51	63	60
Sweden	29	54	46	27	33	36	41
Netherlands	34	56	76	36	51	68	62
Rest of Western Europe ..	170	202	248	176	201	230	N.A.
Total group 2	1,389	1,827	1,948	1,604	1,572	1,801	
Total of groups 1 and 2 ..	1,533	2,023	2,149	1,783	1,754	1,993	
3. Countries mainly consuming domestically produced wool:							
Eastern Europe and U.S.S.R. ..	355	238	278	298	445	527	N.A.
Rest of South America ..	36	61	69	87	94	79	N.A.
Rest of Asia	132	153	126	151	198	226	N.A.
Rest of Africa	29	51	49	51	58	47	N.A.
Total group 3	552	503	522	587	795	879	
World total	2,085	2,526	2,671	2,370	2,549	2,872	

* Adapted from statistics in "Wool Intelligence", issued by the Commonwealth Economic Committee.

N.A., not available.

since 1922. In particular it shows the boom in wool prices in the early 1920s, when per capita wool supplies were tending to fall and per capita incomes tending to rise; the slump of the 1930s caused by the violent fall in per capita incomes with an unchanged level of per capita supply; the post-war boom occasioned by the conjunction of falling per capita supplies and rapidly rising per capita incomes on which was superimposed (as shown) the effect of the Korean war boom. At present, world per capita supplies of wool (as shown in Table 5) are barely above their pre-war level, and this fact in conjunction with the very fast rate of growth of per capita world incomes would have led to continued high prices had it not been for the influence of synthetic fibres.

The fibres which compete directly with wool are the newer synthetics which may be called wool-type synthetic fibres. The output of these fibres has increased very rapidly in the last decade, particularly in the U.S.A., and though some proportion of the output is used for products which are not traditionally made of wool, the bulk of the output has had the effect of displacing wool from some of its traditional uses.

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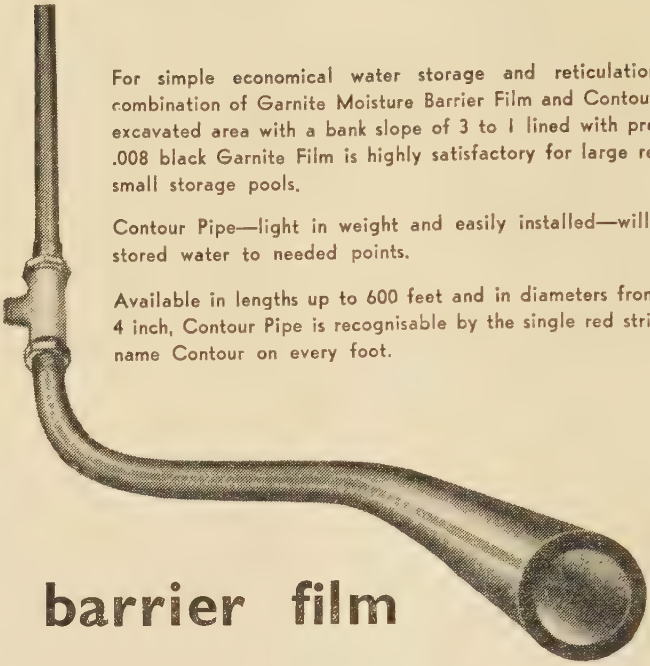

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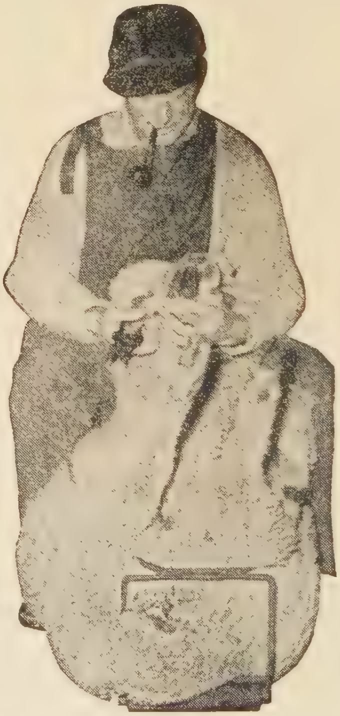

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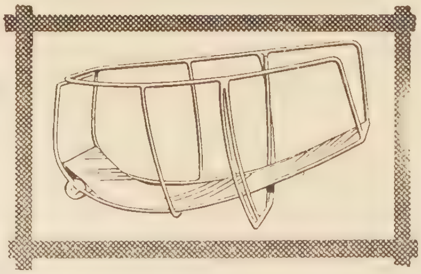

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TABLE 5—WOOL TEXTILES AVAILABLE FOR HOME USE PER HEAD OF POPULATION*

	1938	1948	1950	1952	1954	1956	1957
				lb. per head			
1. Main wool exporting countries:							
Australia	7.4	10.6	10.0	7.3	7.5	7.7	N.A.
Argentina	4.9	4.2	4.3	3.5	3.1	3.2	N.A.
Uruguay	1.4	3.7	2.7	4.7	4.2	5.7	N.A.
South Africa	1.1	1.8	1.2	1.5	1.7	1.6	N.A.
New Zealand	6.9	8.3	11.3	10.2	9.3	7.3	N.A.
2. Countries consuming mainly imported wool:							
United Kingdom	7.0	6.3	6.5	4.6	5.8	5.9	6.0
U.S.A.	2.2	4.9	4.5	3.4	2.3	2.7	2.1
France	4.3	4.6	3.7	3.5	3.9	4.4	4.7
German Federal Republic	2.9	0.9	3.3	3.1	3.7	4.8	5.3
Japan	0.9	0.1	0.6	1.3	1.1	1.7	1.8
Italy	0.5	2.6	2.1	2.2	1.5	0.7	1.0
Belgium	3.9	4.6	4.7	3.9	3.0	2.3	2.5
Canada	3.8	6.1	4.9	3.6	3.4	3.9	3.7
Sweden	4.6	7.8	6.6	3.8	4.6	4.9	5.6
Netherlands	3.9	5.7	7.5	3.4	4.8	6.2	5.7
Rest of Western Europe	2.1	2.2	2.7	2.0	2.2	2.5	N.A.
3. Countries mainly consuming domestically produced wool:							
Eastern Europe and U.S.S.R.	1.4	0.8	1.0	1.0	1.5	1.8	N.A.
Rest of South America	0.3	0.5	0.5	0.6	0.6	0.5	N.A.
Rest of Asia	0.1	0.1	0.1	0.1	0.1	0.2	N.A.
Rest of Africa	0.1	0.3	0.3	0.3	0.3	0.2	N.A.
World average	1.0	1.1	1.1	1.0	1.0	1.1	N.A.

* Adapted from statistics in "Wool Intelligence", issued by the Commonwealth Economic Committee.

N.A., not available.

When the supply of wool and of wool-type synthetic fibres is added together and expressed on a per capita basis we find that whereas the world per capita supply of wool in 1958 is 5 per cent greater than in 1934-38, the per capita supply of wool and wool-type synthetics is 35 per cent greater. This fact is shown by the dotted line on Diagram 2. The quite rapid increase in the supply of wool, plus wool-type synthetics, in conjunction with the tendency for world economic activity to slow down in the last 2 years, has had the effect of slowly bringing prices down from the peak level even though in relation to the general price level wool prices are still 50 per cent above their pre-war level (remembering that we are dealing with 3-year averages).

Current Situation

Seasonal fluctuations in price are very closely connected with the seasonal changes in the rate at which wool is being consumed in the mills relative to the supply of wool over the season, but because of the number of stages through which wool has to pass before it is finally sold as textiles mill consumption of wool may frequently be out of line with final retail consumption. For one thing, the price at which wool textiles are being retailed is bound to incorporate the price of wool relating to a much earlier period, so that, for example, at present retail sales of wool textiles are only now starting to be made at prices reflecting the lower wool costs of 1957-58. Then again the direct link between final consumption of wool textiles and mill consumption of wool is frequently broken by large fluctuations in the inventories held by wholesalers, retailers, etc.

The relationship between seasonal average wool prices—again relative to the general price level—and mill consumption of wool is shown in Diagram 3. By and large the two series move together, though there are exceptions, some of which are due to the counteracting movement in level of wool supply over the season, which is also shown on this diagram.

The fall in prices in 1957-58 has, as in the past, been caused by a fall in mill consumption and, in fact, the progressive decline in prices month by month over the 1957-58 season was paralleled by a similar progressive decline in wool consumption, which decline is only now starting to flatten out.

Up to the date of writing all the available statistics indicate that the fall in mill consumption during the 1957-58 season **did not** reflect a similar fall in final demand. Exports of wool textiles from the main exporting countries have fallen slightly (and may fall even more as the effect of Australian and New Zealand import controls is felt), but retail sales in the main consuming countries have been well maintained in spite of the all-pervasive effect of the U.S.A. recession. What seems to have happened (at any rate in Britain and Europe) is that in 1956-57 retail sales of wool textiles began to rise and so too did purchases for stock by wholesalers and retailers. This move toward increased stock holding, though it was partly the cause of the rise in wool prices which occurred over the 1956-57 season, was at the same time strongly reinforced by the strengthening of prices. Once wool prices began to fall, in 1958-59, wholesalers and retailers decided to live off their inflated stocks and the reduction in orders which followed served only to aggravate the price decline throughout the season.

Until, therefore, there is some indication that there has occurred a severe falling off in the sales of wool textiles to final consumers, we are justified in regarding the downswing in prices of 1958 as an offset to the upswing of 1957, and neither the high prices nor the low should be regarded as any indication of what we can expect in future.

Long-term Future

The experience of the past, as evidenced in Diagram 2, suggests that a general downward trend in prices will occur only if the rate of growth in the supply of wool and wool-type synthetic fibres exceeds the rate of growth of world population and world income.

There is every prospect that world population and income will grow at the rates experienced in the post-war years. On this assumption, calculations made elsewhere* suggest that the demand for wool-type fibres could rise by about 3 per cent per annum over the next 20 years.

Unless there is a radical change in policy in the main wool growing countries, it is most unlikely that wool production will increase by much more than 2 per cent per annum, so that our fears of oversupply and steadily declining prices arise from increased production of synthetic fibres. How can this be prevented?

The newer synthetic fibres were developed in view of what appeared to be a persistent shortage of wool-type fibres, a shortage reflected, as Diagram 2 shows, in the high prices of the post-war decade. The way to prevent too rapid an expansion in synthetic production is quite simply to produce more wool. Production costs for synthetics are very much higher than those for wool. By rapidly expanding wool production and thereby keeping the price of wool to a **reasonable** level, we also keep down the prices which synthetic fibres will bring. The inducement to expansion in synthetic production may have been very great in the immediate past; it would be unlikely to be as great if prices were much closer to costs of production.

Wool producers can retain their share of the market for wool-type fibres only if the world is well supplied with wool. If this does not happen, the higher prices which result (or even the prospect of higher prices) are sure to induce synthetic producers to expand production even faster than they have done. Wool producers should not therefore be afraid of oversupplying the market; in fact an occasional tendency toward temporary oversupply may be a good thing if it assists in preserving the position of wool in the future. Wool growers' main concern should be to increase production sufficiently to meet the steady growth in world demand.

This does not mean that we can afford to ignore questions relating to

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* "The Economic Record", August 1957, "Wool in the New Zealand Economy", B. P. Philpott.

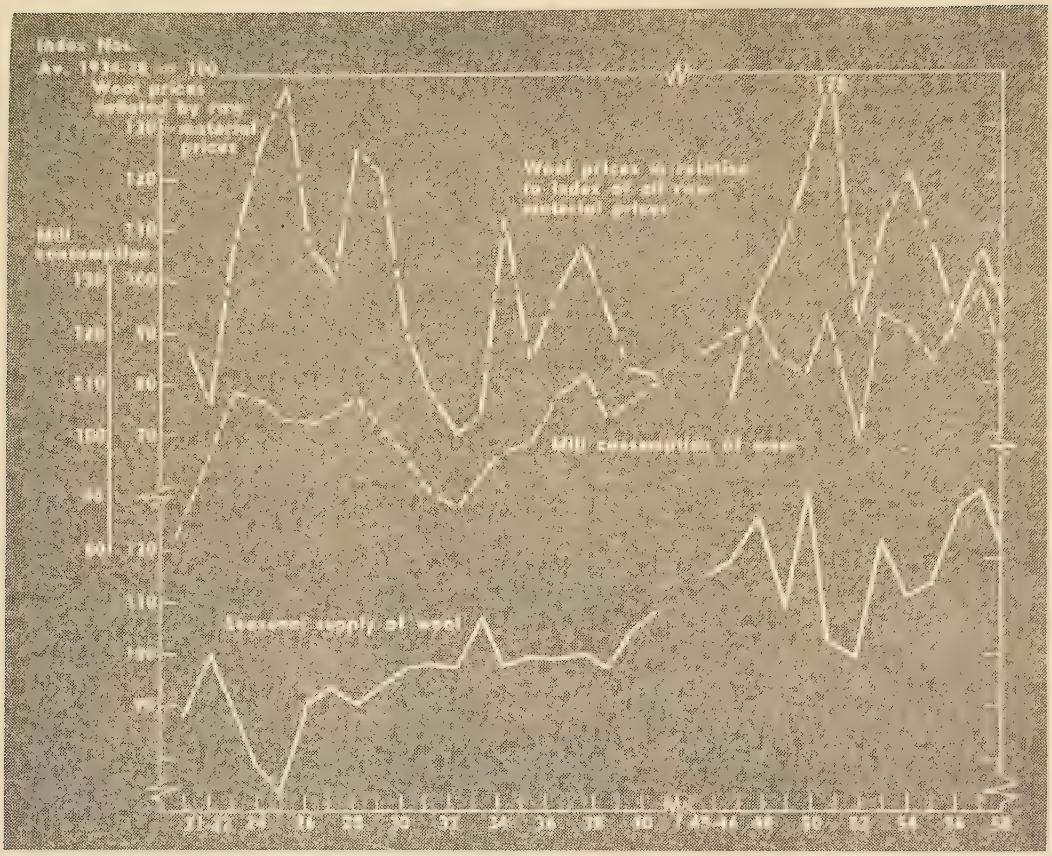


Diagram 3 — Wool prices (deflated), mill consumption, and supply of wool (seasons July to June 1920-21 to 1957-58).

the marketing of wool, for the growth in world demand suggested by this article is only **potential**. To make it **actual** may require considerable research and adaptation in marketing, some problems of which are discussed below.

Wool Marketing Problems

Preparation of the Clip

The problem is to decide how much classing and sorting of the clip should be done in New Zealand and how much should be left to overseas buying firms. When the bulk of our wool was sold to a large consuming country like Britain the detailed sorting of the wool into standard lines could be economically left to the Bradford firms; but with the number of countries now buying it may be profitable to sort wool into standard lines especially tailored for specific markets. Here is an important avenue for wool research.

Price Fluctuations

Fluctuations in wool prices between seasons and within seasons have characterised the market for many years. They are a source of concern to farmers and manufacturers alike. Wool producers find it difficult to plan and budget in advance of the sale of their clip, and the premiums that should be paid for effort in producing and preparing a good clip are often swamped by sudden changes in market prices during the season. Wool textile manufacturers also find short-term fluctuations in wool prices a great disadvantage, especially when they compare the instability of wool prices with stability in the prices of synthetic fibres. The New Zealand Wool Commission with its floor price has so far proved of immeasurable value to wool producers in smoothing out the worst of these fluctuations as far as New Zealand wools are concerned, but we should now be devoting serious thought and research to methods by which the scope of these operations should be extended.

International Trade

Tables given at the beginning of this article illustrate the complex international trading relationships involved in the flow of wool from producer to final consumer. It is vital to the steady expansion of wool textile consumption in future that there should be an equally steady growth in levels of general international trade with the minimum of trading restrictions.

Firstly, encouragement should be given to **low cost** wool textile producers to export freely to all markets, because the price of wool textiles depends more on the manufacturing and processing costs than on the price of raw wool. Secondly, high levels of multilateral international trade are required so that countries can earn the foreign exchange with which to buy imported wool and wool textiles. However great may be the potential demand for wool textiles in wool importing countries such as Germany and Japan, inability to finance the imports of wool could easily lead to the encouragement of synthetic industries independent of imports, even though the synthetic products might be much more expensive and less satisfactory than woollen fabrics.

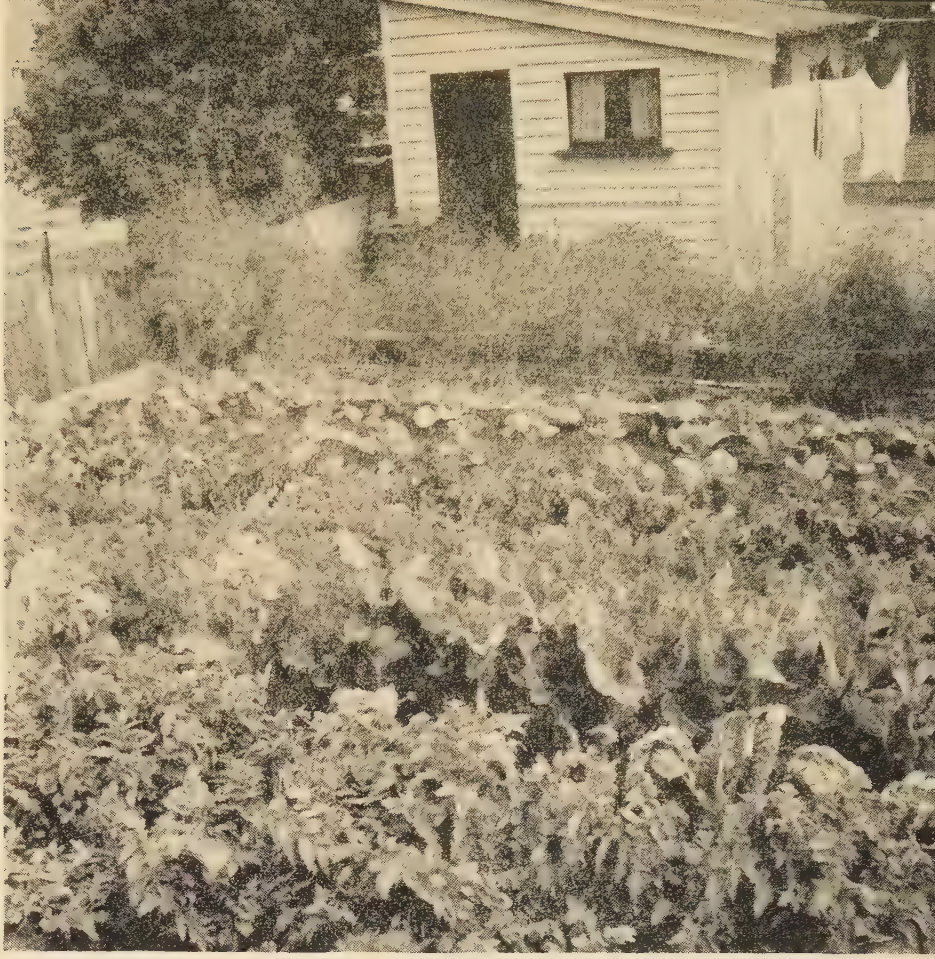
8th International Grassland Congress

THE 8th International Grassland Congress is to be held at Reading, England, from 11 to 21 July 1960. The offer of the United Kingdom to act as hosts in 1960 was accepted at the Congress held in New Zealand in 1956.

The Congress is designed primarily for scientists, and papers will be given by leading world authorities on many aspects of grassland husbandry, including pasture management and fertilising; plant breeding and genetics; estimation of grazing intake; conservation—recent developments; problems of tropical grassland; biochemistry of pasture plants; hormone stimulation of grazing animals, and special statistical techniques.

Most of the papers to be presented will be commissioned by the organising committee, but requests will be considered from research workers who wish to present papers of particular interest. The secretary's address is Reading, Berkshire, England.

The Home Garden in March



MARCH should be one of the most rewarding months for most competent home gardeners, as, in all except the smallest gardens, there should be a great variety of vegetables ready for harvesting. Most of the main crop vegetables are mature and a few are getting past their best, but weeds that have not been dealt with are growing vigorously.

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

THOUGH many home gardeners tend to lose interest in their gardens by March the growing season is not yet finished. Work still to be done includes weed control, the sowing or planting of crops to mature before winter or to become established to the stage where full, rapid development can take place in early spring, composting, watering where necessary, and digging over and sowing vacant land with green crops. Shallots and onions can be harvested and the pods of peas and beans should be gathered before they are fully mature so that the growth of the plants will not be checked.

Vegetables for winter and spring use, such as cauliflowers, broccoli, leeks, savoy cabbage, and silver beet, should be kept cultivated and, where necessary, fed with liquid manure to ensure that good growth is maintained.

Main crop potatoes can be harvested when they are mature. Earlier-sown crops such as lettuce, spinach, and silver beet can be thinned or seedlings can be planted out.

The spraying of brassicas with an insecticide (lindane or DDT) and of celery with a fungicide (zineb or captan) against leaf spots and, in most northern districts, of potatoes and tomatoes with bordeaux or other copper spray or zineb against late blight should not be overlooked.

The compost heap should be built up and rubbish infested with active insect pests or bearing the spores of long-lived or highly resistant diseases should be burnt.

Cabbages for Spring Use

Cabbages for spring cutting from the first February sowing should now be developing well. Seedlings should be sprayed where necessary with DDT against caterpillars and thrips or with lindane if aphids are present. Mildew often becomes troublesome as dampness becomes more general with the advance of autumn, particularly where there are heavy dews and cooler conditions. Bordeaux or copper oxychloride will control mildew, but sprays are sometimes difficult to apply, as the small leaves of cabbage and cauliflower seedlings tend to lie flat under spray pressure.

A spray with a fine jet which disperses the spray into very fine droplets which drift as a mist is most effective, but an added wetter such as a few drops of household detergent is usually helpful in enabling the spray to wet the leaves.

Home gardeners often remove plants from the seedbed and set them out when they are very small. This practice is advisable only if the garden is sheltered and conditions are favourable. Plants for spring cutting are usually set out in April. They should be sturdy, close jointed, hardy, and well developed and should be lifted with a fibrous tuft of soil and roots.

In the home garden, where there is usually no delay between lifting and setting out the plants, it should not be necessary to puddle roots in thick, muddy water to keep them moist as is sometimes done under commercial conditions. When the plants are lifted

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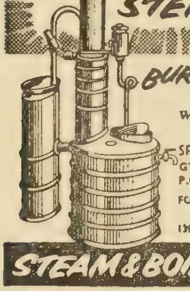

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the top growth can be dipped in a solution of lindane or DDT and nicotine sulphate if aphids and caterpillars are troublesome.

Spring Cauliflowers

Where winters are not too severe cauliflowers for spring use can also be raised in autumn for growing through the winter. Cauliflowers are more sensitive to adverse conditions than either cabbage or broccoli, but they can be grown on almost any well drained soil, provided it is well supplied with plant food and moisture. Soils should be deeply cultivated and rich in well rotted organic matter supplemented by a complete fertiliser.

Unless cauliflowers are able to grow continuously, the curd may not develop properly. Many soils benefit by liming annually at about 2 to 3 oz. of carbonate of lime to the square yard some time before planting. More may be necessary in higher-rainfall areas.

As cauliflowers must not be checked and the curd is liable to frost damage, seed sowing must be arranged to suit the climate. Plants should not be overwintered in the field under conditions where the weather is cold enough to check growth severely and they cannot be grown successfully where conditions are excessively dry as in some districts in late summer or autumn. Very cold winds have also been known to affect curd development adversely. Except in mild climates plants for setting out in early spring should be raised in autumn or winter, either under glass or in very sheltered situations.

[*Green and Hahn*

Self-blanching celery may be blanched by having 10 or 12 in. wide planks placed on edge round the sides of the bed. The planks can be held in place by pegs.

The seedbed for cauliflowers should be well drained and worked to a very fine tilth. Seed should be sown ¼ to ½ in. deep, preferably in rows, as the soil is easier to cultivate and the young plants are usually easier to lift than when seed is broadcast. Good varieties for overwintering or spring planting include All Seasons and Walcheren.

Celery

Early celery should now be ready for harvesting. As some of the quick-maturing varieties that are usually grown for early use tend to become over-ripe and pithy and lose weight and flavour if held too long, plants should be watched for signs of near or full maturity and harvested and used then.

Celery is usually harvested by the removal of the blanching paper or boards and the driving of a sharp spade or cutter under the bases of the plants. They can then be lifted, the remaining roots trimmed off with a sharp knife, and any damaged outer leaves stripped off.

The quality of celery, like that of most other vegetables, falls off progressively the longer it is kept after harvesting, though falling off in quality is less important if celery is to be used in soups or stews than if it is to be used for salads. Good produce may be stored up to 2 to 3 weeks at cool to near-freezing temperatures. Though some of the inferior types of celery which are often grown for early use are best used (for salads) immediately after harvesting, all varieties, whether early or late, can be stored in a refrigerator or in a trench if it is in a sufficiently cool, shady part of the garden.

Where celery is stored in a trench ventilation must be good or rots are likely to develop. The plants should be stood upright so that the bases, either partially or cleanly trimmed, rest in the cooler, moist soil at the bottom. The trench can be covered with two fairly wide planks set to form a ridge to turn rain and provide shade.

Low temperatures are detrimental to celery during the early stages and may cause premature seed stalk development. However, plants past the seedling stage and well established thrive in relatively cool conditions.

Liquid Manure

As celery is a moisture-loving plant and as its fertiliser needs are high, liquid manure is usually helpful where conditions tend to be dry and soil fertility is low.

Blanching

Blanching of the main crop is usually begun in most home gardens in March, early or late in the month according to growth of the crop, variety, and district. Most self-blanching varieties can be blanched in from about 10 to 21 days, but with the non-self-blanching varieties blanching may take about 14 to 40 days according to variety, temperature, the extent of blanching desired, and whether it is done in stages.

Self-blanching celery is usually blanched by placing 10 in. or 12 in. x 1 in., boards, held in place by pegs, round the sides of the beds. Stiffened paper can be used in place of the boards. Non-self-blanching celery can be blanched similarly, but as blanching takes much longer, plants are usually either wrapped individually in stout paper held with string or elastic bands or earthed up in fine weather with clean, free-working, reasonably dry soil. Preferably this should contain little organic matter likely to cause rots and be free from the eggs of slugs or similar harmful creatures. Small or decaying outer stems should be removed before the soil is drawn up.

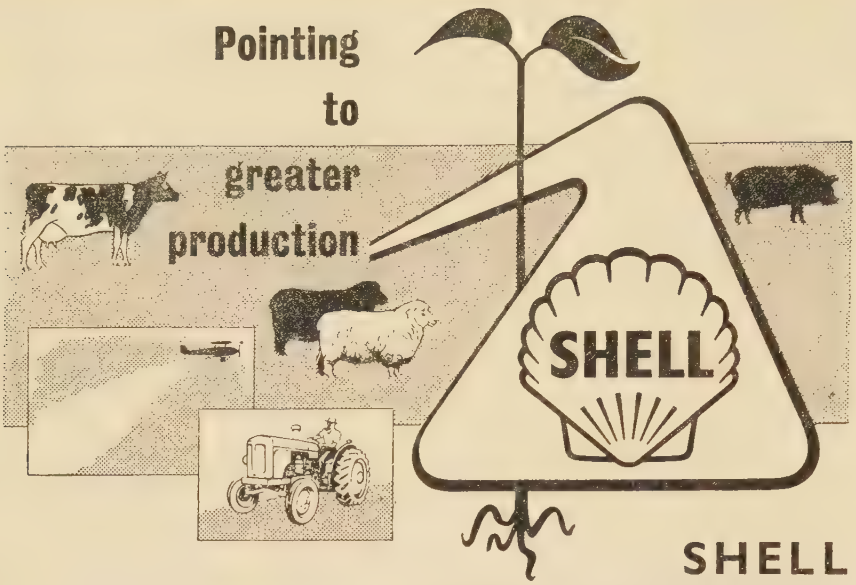
SUCCESSIONAL SOWINGS

The number of vegetables that can be sown now in most districts with prospects of their maturing before winter is comparatively small. Quick-maturing varieties of spinach, radishes, turnips, and beetroot can be sown early in the month, but even with these vegetables success in most districts depends largely on weather, situation, and favourable cultural treatment.

Soil for all the above vegetables should be well drained and rich in plant nutrients and humus. Quick growth is essential to good quality. The soil should be deeply dug and cultivated to a fine tilth. Soil lacking humus can be improved by the thorough incorporation of compost or well rotted farmyard or stable manure.

Seed can be sown ¼ in. to ½ in. deep in rows 12 to 15 in. apart. The ordinary type of radish can, however, be sown in rows 6 to 9 in. apart or broadcast in prepared beds, which for convenience when radishes are being gathered should not be more than about 3 ft. wide.

Vegetables such as lettuce, silver beet, and cabbage or cauliflower can also be sown to mature in spring. In the colder districts a warm, sheltered, well drained situation should be chosen.



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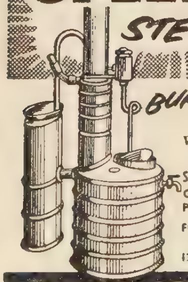

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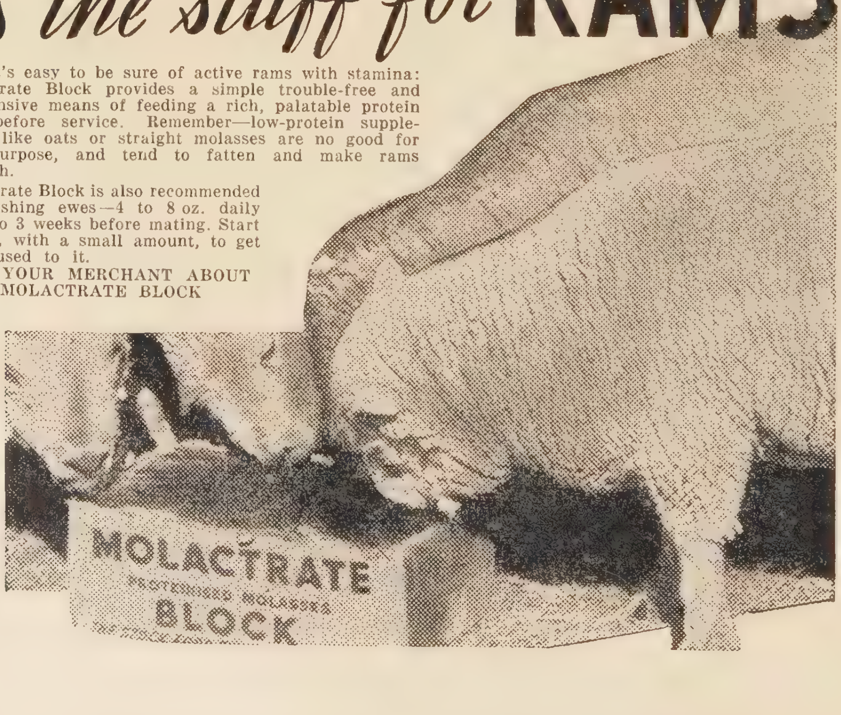


The banked earth should be ridged sharply and the soil surface beaten smooth with a spade to shed rain. Under wet conditions rots may develop if soil remains touching the inner stalks after earthing up. The stems should therefore be drawn together when the soil is packed round them.

Blanching with clean, odourless paper is quite satisfactory. A long strip of strong paper can be placed along the sides of the bed and held in position with heavy arched wires. Blanching tends to check growth and therefore should not be begun until the plants are well on toward maturity. If, however, a good head of leaves is left at the top and soil is used for blanching and is not too tightly packed, plants should continue growing. Self-blanching varieties contain very little chlorophyll in their leaf stems and can be blanched very simply and quickly with paper or boards.

Home gardeners who have a large planting of one variety of celery and who intend to harvest it over a long period can begin blanching when the plants are about two-thirds grown.

Onions and shallots are usually ready for harvesting by March.

Celery Leaf Spot

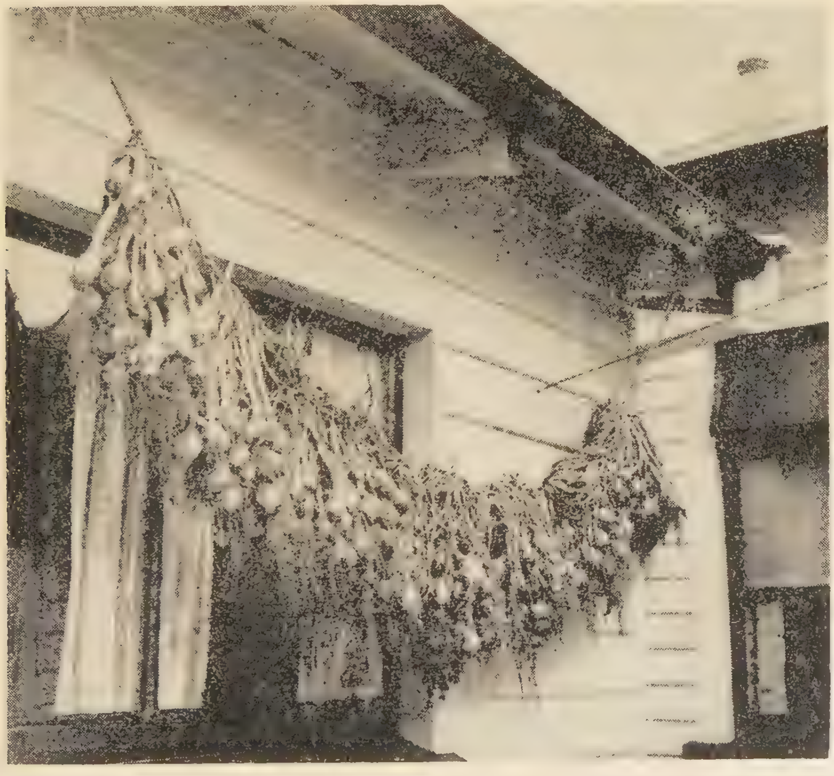
Celery leaf spot is the most serious disease of celery and often injures foliage severely and blemishes the outer leaf stalks. It may be seed borne and often infection starts from the seed. Leaf spot may be caused by one or other of two closely related fungi which give rise to somewhat different though superficially similar symptoms.

When fine, dry weather prevails after planting the spread of the disease may be slow, but if a spell of wet weather intervenes or overhead irrigation is resorted to, the spread may be rapid. Damage is usually worse when the weather allows plants to grow only slowly while the fungus can develop quickly. These conditions are usually during dry weather when there is not enough soil moisture for good plant growth but there are cool, dewy nights followed by dull days. Under these conditions plants may be moist for the greater part of the day and this enables the fungus to develop so rapidly that the plants are unable to overcome the attack.

Control consists of spraying with bordeaux mixture or copper oxychloride or one of the newer certified therapeutants such as captan or zineb which usually give effective control without causing damage as bordeaux sometimes does.

Green Varieties

Green varieties, which have been developed in the U.S.A., where they are very popular, are now available in New Zealand. They are tall with thick, meaty, stringless stems. Utah 10 B and Utah 52-70 are two strains which have been satisfactory in New Zealand and of which seed is available.



Where ground conditions are likely to be wet onions can be dried off and cured by being hung in a sunny situation where they will be protected from rain.

Chives

Chives are a useful mild substitute for spring onions, and young plants, which are usually obtained from the division of old stock, can be set out in March 12 in. apart. Once established the plants can be cut regularly to obtain a succession of young leaves for use in salads, sandwiches, or for flavouring.

Chives make an excellent border for the vegetable garden. Usually they should be dug up, divided, and replanted every third year. Stock for planting is obtainable from most nurserymen.

Kumaras

Most varieties of kumaras are likely to be injured when the temperature falls to about 40 degrees F. (8 degrees above freezing) and the keeping quality is likely to be so seriously affected that long storage is impossible. Where the kumara crop is mature and long keeping is intended digging should begin before temperatures fall too low. Elsewhere cultivation can be carried on to assist the crop to mature.

Cultivation of kumaras includes control of weeds, maintenance of the height and shape of ridges, and, where necessary, lifting of the vines to prevent rooting. Such rooting appears to favour leaf rather than tuber development. Weed control should be very thorough, as kumaras are poor competitors with weeds, which reduce yields and hinder harvesting.

Onions

As soon as the necks of the onion bulbs lose enough of their stiffness to allow the tops to fall or bend over readily the crop is ready to harvest. This stage can be detected readily by the drooping of the tops just above the bulbs while the leaves are still green.

Gradual dying back from the tops of the leaves while the necks remain rigid, erect, and thick is an indication of abnormal ripening and usually of poor keeping quality. Insect pests or some inherent weakness in the plant may be responsible. There is likely to be a percentage of this type in practically all crops.

The roots of a healthy, well grown onion ready or nearly ready for harvesting lose their hold on the ground as they gradually die and the neck softens (owing to the transferring of the soluble solids of the leaves into the bulb) until the outer crust of the bulb nearly closes the opening of the inner scales. After maturing, bulbs should be cured by being turned regularly to dry them evenly if the crop is not harvested.

Harvesting

Correct harvesting has an important bearing on keeping quality and, apart from maturity, the important factors in deciding when to begin harvesting the crop are the state of the weather and whether the onions are for long keeping or for early use. The tops should be allowed to dry out as much as possible before they are trimmed or twisted off and an inch or two of the tops should be left if trimming is done to avoid the exposure of the succulent tissues of the fleshy scales of the bulb. Careful handling to avoid bruising and proper drying of the bulbs have a very important influence on the keeping of onions. Where the soil is wet onions are usually late in maturing or drying off.

If thrips are still troublesome, onions should be sprayed, as thrips reduce the effective green leaf area and so check the development and ripening of the bulbs. Thrips, which are minute, slender insects, lay eggs in the tissue near the bases of the onion leaves. From these eggs small, yellowish nymphs emerge. They are then at the first of four nymphal stages.

During the first two stages nymphs feed at the bases of the leaves.

Adult thrips feed over the entire leaf by puncturing the leaf surface and imbibing the exuding sap. Damage to the leaf surface causes whitish blotches and lowers the vitality of the plant.

Thrips can be controlled by regular spraying with lindane or DDT.

Potatoes

In districts where potato crops are likely to be attacked by late blight they should be sprayed with bordeaux or a certified substitute unless digging is to be begun without delay. If potatoes for keeping for several months are dug when unripe, heavy loss in storage is likely. Where the crop is mature and late blight is present but time does not permit digging, the haulms should be destroyed by being pulled off and burnt.

Haulm destruction is recommended as a control for potato blight on mature infected crops which cannot be sprayed thoroughly or dug at once. The blight fungus continues to produce spores as long as green haulm remains. Heavily infected haulms should therefore be removed or killed promptly, as otherwise there is risk of contamination of the tubers at lifting time. Risk of contamination remains even 10 to 15 days after the haulm dies or is killed.

Potatoes are mature when the skins of the tubers are firm and do not rub off easily. While top growth is healthy and vigorous, tuber growth will continue. The tops therefore give the first indication of crop maturity. Experiments to test the effects of haulm destruction on the setting or the maturing of the skins of tubers indicate that skin setting or hardening during maturation of the haulm is gradual, speeding up as the haulm yellows and dies and continuing for some time after the death of the haulm.

Meteorological Records for December

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	66.4	+ 3.7	82.2	44.6	8.25	16	+ 4.40	1.50	8	146
Auckland	160	66.3	+ 2.6	77.3	53.4	7.16	17	+ 4.23	1.19	14	151
Tauranga	12	65.6	+ 3.5	81.0	46.3	7.22	13	+ 3.69	1.33	21	175
Ruakura	131	64.4	+ 3.7	78.1	42.9	8.35	18	+ 5.27	1.72	23	137
Whakarewarewa ..	1006	63.6	+ 3.4	81.9	47.3	12.62	15	+ 8.46	2.68	14	144
Gisborne	14	66.6	+ 3.9	86.9	41.5	2.37	14	+ 0.46	0.83	15	219
New Plymouth ..	160	63.8	+ 3.8	74.9	49.4	23.31	24	+ 18.72	7.04	23	144
Karioi	2125	59.6	+ 4.4	75.5	36.9	4.58	15	+ 0.67	1.37	23	
Napier	5	66.6	+ 3.4	88.0	42.5	6.32	16	+ 4.34	2.41	24	186
Wanganui	72	64.6	+ 3.2	78.2	41.1	7.28	15	+ 4.42	2.56	23	191
Palmerston North ..	110	63.8	+ 3.4	78.8	44.8	6.68	20	+ 3.40	2.48	23	160
Waingawa	340	63.1	+ 2.9	80.0	35.0	6.19	18	+ 3.68	2.12	23	194
Wellington	415	61.1	+ 2.0	73.8	42.0	5.10	18	+ 1.64	0.90	16	188
Nelson airfield ..	5	62.6	+ 3.2	77.3	49.9	5.78	13	+ 2.94	1.38	23	199
Blenheim	12	64.4	+ 3.6	85.1	40.9	2.49	11	+ 0.49	0.73	23	235
Hokitika South ..	15	58.9	+ 2.8	71.5	43.4	8.80	21	— 1.16	1.32	2	166
Hanmer	1270	58.8	+ 1.0	82.0	34.0	4.47	15	+ 0.76	0.87	23	182
Christchurch ..	22	62.2	+ 2.4	86.7	45.5	1.47	10	— 1.07	0.52	14	212
Ashburton	323	60.1	+ 3.0	86.2	37.0	2.34	8	— 0.67	0.76	14	182
Timaru	56	60.0	+ 1.3	88.9	40.0	4.19	11	+ 1.53	1.14	16	194
Alexandra	520	61.6	+ 1.4	81.9	41.2	2.21	10	+ 0.91	0.53	16	208
Taieri	80	56.6	+ 0.6	79.8	35.2	2.19	12	— 0.37	0.46	16	187
Invercargill airfield ..	0	55.2	+ 0.2	71.2	35.0	3.30	15	— 0.30	0.77	7	187
Chatham Islands ..	140	58.8	+ 3.0	71.0	40.5	1.79	14	— 0.50	0.52	23	

Research Unit Assessment of

HYDATID CONTROL PROBLEMS

HYDATID disease has been known in New Zealand for over 80 years and for the past 25 years or so some effort has been made to control it, but only recently has public interest been roused sufficiently to give promise of firm backing of all efforts made to eradicate the disease. Various aspects of hydatid control are now being investigated by the Hydatid Research Unit of the New Zealand Medical Research Council, set up in 1957. This unit has already completed a survey in the South Island and sections of a report* by the unit's Director, M. A. Gemmell, have been adapted for presentation in this article.

THE hydatid control campaign aims at eradication of the disease to:

1. Eliminate human suffering.
2. Avoid substantial loss in export income because of condemnation of animal livers.

The first depends on the elimination of the tapeworm *Echinococcus granulosus,* of which the only primary host in New Zealand is the dog. But the dog is also infected with three other species of tapeworms, which though not affecting human health, cause loss in stock. These are *Taenia hydatigena* (often known as *tenuicollis*), *T. ovis,* and *Multiceps multiceps.* In their early stage the cysts caused by *E. granulosus* and *T. hydatigena* in animal livers are similar, and livers are likely to be condemned without the specific tapeworm being identified. Control for hydatids must therefore embrace the elimination of both *E. granulosus* and *T. hydatigena.*

In the first part of the Hydatid Research Unit's programme a survey of infestation in dogs and sheep in the South Island has been undertaken. On farms where little attempt was being made to prevent dogs gaining access to raw offal and only sporadic dosing was done 90 of the 241 dogs examined were harbouring *E. granulosus.* Where earnest attempts were being made to prevent dogs from having access to raw offal only 111 dogs of 1,981 examined were affected with hydatid worms. Most of these infestations were light.

If it is assumed that the incidence found on farms taking no precautions is a basic maximum, the drop in incidence through voluntary control from 1 in 3 to 1 in 18 dogs affected appears to be a satisfactory achievement. However, the proportion of farms on which little attempt is being made to control tapeworms or on which control is haphazard is still considerable. Because of this 1 in every 11 farm dogs in the South Island is still affected with *E. granulosus.* If it is assumed that there are more than 200,000 dogs (including unregistered animals) in New Zealand, there are, despite voluntary eradication schemes, more than 20,000 dogs harbouring hydatid tapeworms.

This number effectively prevents a major reduction in the incidence of hydatid cysts in sheep, the main reservoir from which further infestation in dogs will continue this parasitic cycle indefinitely.

A high incidence of *E. granulosus* was found in dogs employed full or part-time at abattoirs or freezing works. Of the 118 examined, 13 were affected. Only one freezing works took satisfactory precautions to prevent dogs from gaining access to raw offal. At the remainder the proportion of dogs affected was considerably higher.

Generally rabbit dogs under the control of rabbit boards were free of infestation, with the exception of dogs that had recently joined packs from farms.

Of the 51 urban dogs examined only one was infested with *E. granulosus,* and there was some evidence that this dog had access to offal from a local slaughterhouse. It appears that the chance of infestation among these dogs is not great and that their part in the spread of hydatid disease is insignificant.

There are therefore only two major groups of dogs responsible for main-

> "The onus . . . to achieve eradication [of hydatids] in a democratic society rests entirely in the hands of the dog-owning community."
> —Hydatid Research Unit report.

[Sparrow

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* "Cestode Problems of Domestic Animals and Man in the South Island of New Zealand", Gemmell, M. A. (1958). "New Zealand Medical Journal", vol. 57, pp. 442-458.

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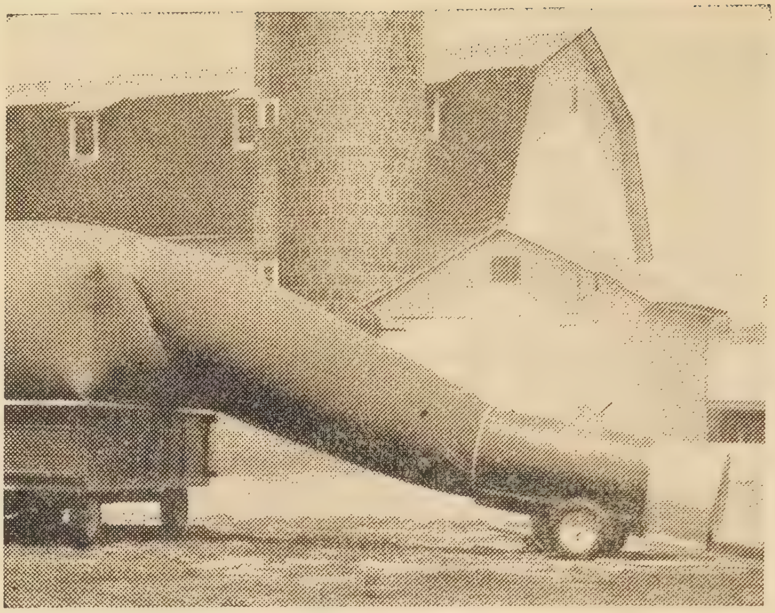

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taining the hydatid cycle: dogs on farms or those employed at freezing works or abattoirs. Control measures should be directed primarily at these two groups.

Incidence in Sheep

As it is not possible to determine in all cases whether "white spot" is due to the larval stages of *E. granulosus* or *T. hydatigena*, the method of identification adopted was as follows: All lesions which could be definitely identified as cystic lesions of *T. hydatigena* were classified as such. Hydatid cysts and all tapeworm lesions which could not definitely be identified were recorded as *E. granulosus*. This means that the incidence recorded for lambs would be a maximum.

Of 69,400 lambs examined in the South Island 2,292 (3.3 per cent) were found to have lesions in the liver which could have been caused by *E. granulosus*.

The incidence of hydatid disease increases with the age of the animals, but the average annual increment of hydatid disease in New Zealand's flocks does not appear to be much greater than 10 per cent. The average incidence for old sheep (full mouth and older) is 42.4 per cent. However, there is considerable variation between farms. Some of the farms selected for the survey had 100 per cent incidence.

The survey confirmed observations made in 1946 by L. K. Whitten, Parasitologist, Department of Agriculture Wallaceville Animal Research Station, that *T. hydatigena* is responsible for most of the cysts in lamb livers.

Economic Problems

The fact that New Zealand relies largely on exports of primary produce for its high standard of living and economic stability accentuates the loss from the tapeworms *E. granulosus* and *T. hydatigena*. Moreover, in New Zealand, contrary to the position elsewhere, these tapeworms are the only major cause of condemnation of animal livers. The high incidence of cysts in edible offals has precluded the export of foodstuffs which could increase overseas funds. This well known high incidence in domestic animals in New Zealand may preclude the full development of markets.

Problems in Control

That both parasites must be controlled is evident from the facts that a greater proportion of livers of young sheep are condemned for *T. hydatigena* and of older sheep mainly for *E. granulosus* infections; that both are responsible for an economic loss and that there is difficulty in differentiating between these parasites in livers, and that the eradication of one may not necessarily increase the export of

Considerable Doubt about "Failure" of Styx Experiment

THE Styx experiment for the control of hydatids may not have failed as is generally believed. Reinterpretation of the results of the experiment has been made by the Hydatid Research Unit, which in its report concludes that hydatid disease **was** reduced by regular dosing of dogs with arecoline hydrobromide and prevention of lungs and livers being fed to dogs.

Carried out in the Paerau-Styx-Gimmerburn area over nine killing seasons from 1943, the experiment sought to determine the effectiveness of the control measures with dogs in reducing hydatid disease in stock. The area was isolated from outside infection except on its northern boundary, where a buffer zone was maintained in which the appropriate control measures were also observed.

Dog owners were requested not to feed lungs or livers to dogs, but **no definite action was taken about intestines.**

At the end of the experiment in 1951 the incidence of "white spot" and cysts in sheep, as determined at freezing works, was assessed, but no attempt was made to differentiate between lesions caused by *E. granulosus* and *T. hydatigena* tapeworms, which in the early stage are very similar.

At that time it was known that the majority of lesions were due to *T. hydatigena*, but cysts due to this parasite were used to assess results, the inference being that as arecoline was equally effective against *T. hydatigena* and *E. granulosus* in the laboratory, and the life cycles of the parasites were the same, this drug should give comparable results for either parasite. No allowance was made for the greater biotic potential (egg production) of *T. hydatigena*.

This, coupled with the fact that arecoline does not always cause satisfactory expulsion of tapeworms and that a newly acquired *T. hydatigena* might produce eggs within the period between successive dosings, makes the negligible reduction of *T. hydatigena* understandable, especially as dogs were not restrained from access to sheep intestines.

The experiment confirmed that dosing with arecoline while still allowing dogs access to raw offal does not alter the incidence of *T. hydatigena*. "White spot" occurrence should not have been used as a criterion for determining the effect of regular dosing of dogs on reduction of the number of sheep affected by hydatid cysts.

Assuming that the trends in *T. hydatigena* and *E. granulosus* incidence in the Hydatid Research Unit survey apply equally to the Styx experiment, the reduction of parasite incidence during the last 2 years of that experiment is likely to be due to a reduction of *E. granulosus* to a very low figure. The experiment may not therefore have been a failure in the sense that hydatid disease was reduced by the measures taken.

Experiment Restarted

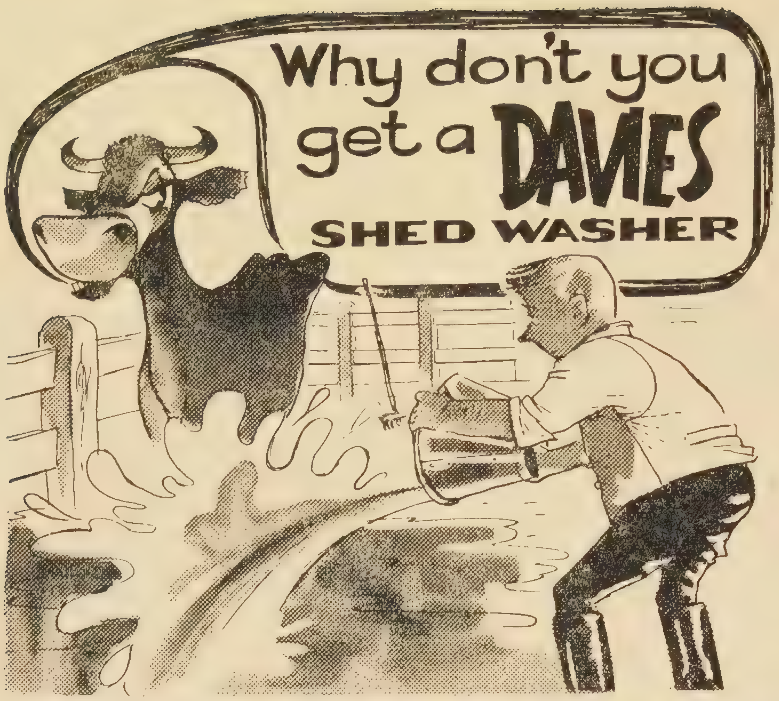
In 1957 the Styx experiment was restarted to determine whether *E. granulosus* and *T. hydatigena* can be eradicated in stock and in what time. Dogs are being prevented from gaining access to raw sheep offal, **including intestines,** and arecoline is being used at specific intervals to determine if dogs are getting such offal unbeknown to their owners.

The criterion for assessment is examination of livers of lambs and sheep for *E. granulosus* and *T. hydatigena* cysts and differentiation of cysts due to either as far as possible.

In the first year no dogs have been found infected with *E. granulosus* and only four with *T. hydatigena*. In all the latter, parasites were present before control measures were adopted. As far as can be determined no reinfestation has occurred since dog owners adopted the voluntary control scheme.

Of 3,553 lambs examined only two had *E. granulosus* cysts in the liver. Of 274 ewes and wethers examined only 29 had livers infested by *E. granulosus*, but 62 livers were affected with *T. hydatigena*.

Of the 3,553 lambs 821 had livers infested with *T. hydatigena*, an incidence which is less than half of that for the rest of New Zealand. The number of white spots per liver was also significantly reduced; it was rare to find more than two on a liver, and after being dressed practically all livers were of export quality. The reduction in incidence of *T. hydatigena* was therefore even greater than differences in percentages of livers infected indicate.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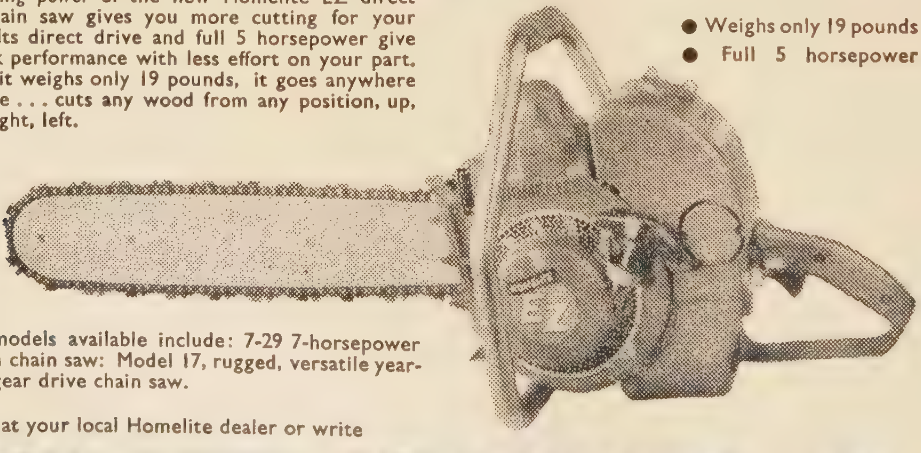

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livers. Both are eradicated by preventing dogs from having access to raw offal and costs for the eradication of both would be the same as for one of them.

There is sufficient evidence to indicate that even if regular dosing of 80 per cent or more dogs is done under supervision but they are still allowed access to raw offal, the numbers of livers affected with cysts will not be greatly reduced. There are two reasons for this: Firstly, a proportion of dogs do not purge satisfactorily after each treatment with arecoline and expulsion of parasites does not occur before egg production begins. Secondly, and more important, especially with *T. hydatigena*, though the number of lesions in each liver may be reduced, a reduction in the number of cysts per liver may not necessarily influence the number of livers affected.

The specific problem in eradication is therefore to ensure that dogs are controlled in such a manner that they cannot gain access to raw offal.

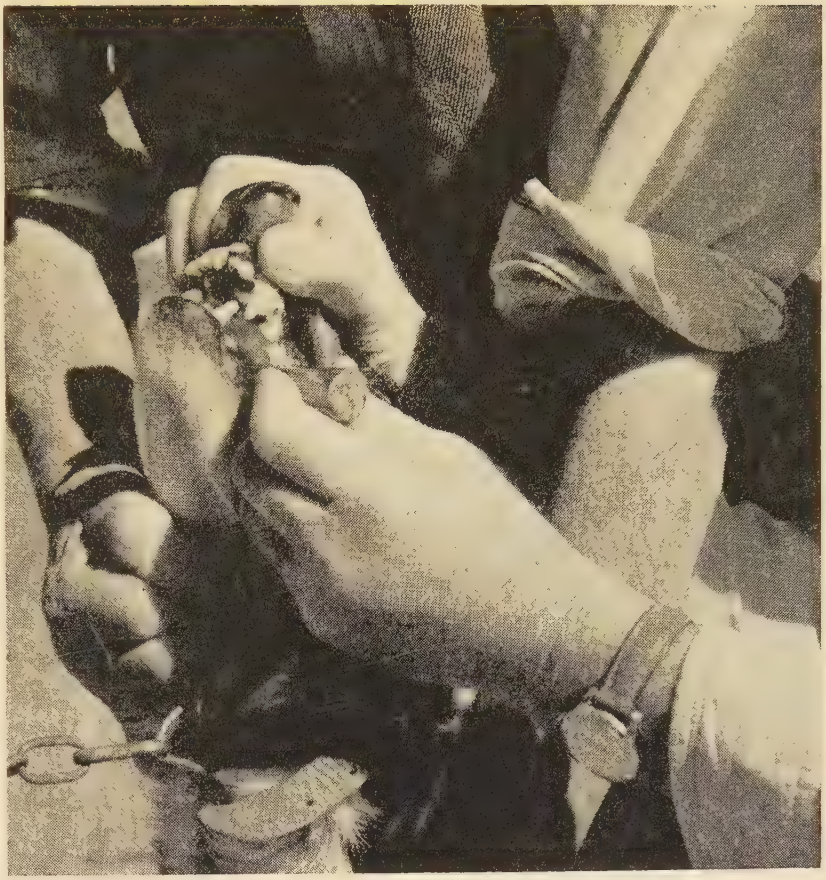
Where most dog owners in a district are making well organised attempts to control tapeworms in dogs the average incidence of *E. granulosus* is greater than 1 dog in 10 infested, and of *T. hydatigena* 1 dog in 5. The average is considerably raised by dog owners who make no effort to control hydatids and by those whose effort still does not prevent dogs from becoming infected. The apparent cooperation in a district therefore does not in itself give an indication of the incidence of *E. granulosus* and *T. hydatigena*.

That *T. hydatigena* is still so prevalent is due to some extent to the fact that farmers are largely unaware of the danger of feeding intestines of sheep to dogs. It also shows that control of dogs is still lax.

Future Control Procedure

In control procedure in future the Hydatid Research Unit report recommends:

1 "Technical aid" (including the use of arecoline, for diagnosis, and reporting to dog owners on their progress in controlling dogs that gain access to raw offal in a voluntary scheme) can be adopted. However, there will be isolated districts and farms where "technical control" only will be effective. ("Technical control" is the term given to the primary stage of compulsory control. It includes the use of arecoline for detection. It cannot be implemented without compulsion, and the controlling authorities must have power to penalise a dog owner whose dogs have been allowed access to material infected with *E. granulosus* or *T. hydatigena.*)



The Hydatid Research Unit report recommends that only men properly trained should dose dogs and they should be responsible for dog registration.

Technical control should not be adopted until technical aid has been fully exploited and public opinion favours compulsory measures.

2 Only men properly trained should dose dogs and they should be responsible for dog registration. Arecoline hydrobromide should be used mainly as an agent for diagnosing tapeworm infestation. The indiscriminate use of arecoline over a long period by untrained persons may result in a large proportion of dogs becoming intolerant to dosing procedures.

3 As soon as dog control officers are available dog owners should not be allowed to handle arecoline.

4 Faecal samples must be examined at definite intervals to determine whether dogs have had access to raw infested offal.

5 The present maximum registration fees must be raised to finance the appointment of dog control officers and to reduce the numbers of dogs.

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A COMPLETE guide to the mass of authoritative material that has appeared in the "Journal" since the first issue appeared in 1910 is contained in the Consolidated Indexes available from Publications Section, Box 2298, Wellington. The indexes cover the periods 1910-20, 1920-30, 1930-40, and 1940-50, and each of the four volumes is available at 10s. a copy.

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Efficient Solid Fuel Hot Water System for Dairy Cleaning

By G. R. INSULL,
Farm Dairy Instructor, Department of Agriculture, New Plymouth

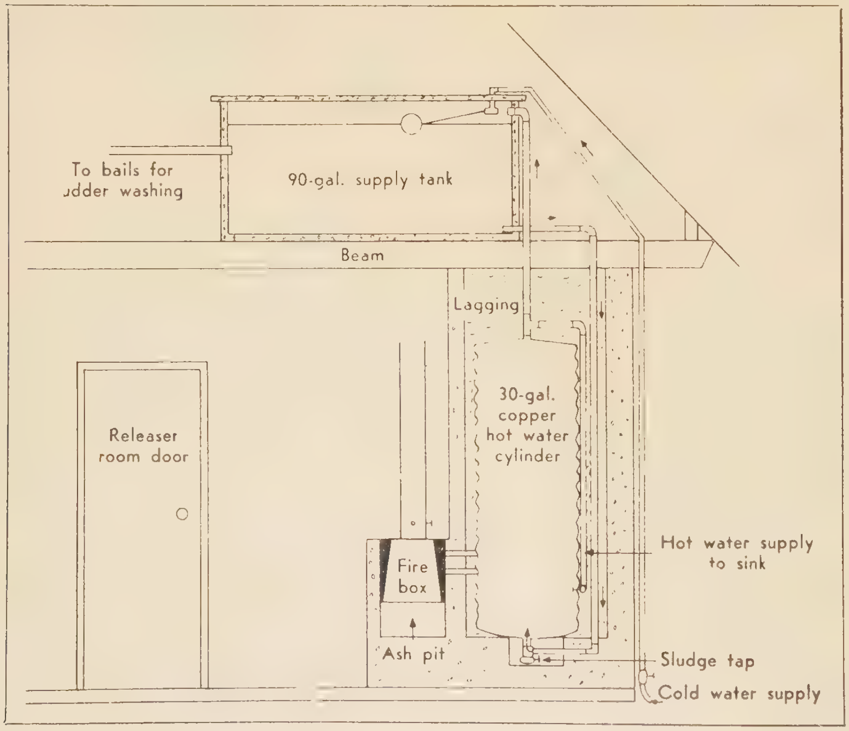
A HEATING system using solid fuel installed by a Taranaki farmer provides ample boiling water for his farm dairy and can be commended to farmers as an alternative to electric systems or for installation in districts where electric power is not reticulated.

EASE of operation and convenience make the electric hot water cylinder the most popular means of providing water for cleaning and sterilising dairy equipment today. However, in some districts there is considerable trouble in keeping plants clean and sanitary due to power failures, inefficient heaters, and the conservation of power, and in some isolated areas where farming districts are not yet reticulated to electric power some alternative means of providing boiling water is necessary.

When Mr W. H. Reader, Kent Road, Taranaki, built his present attractive dairy premises some 2 years ago he incorporated in his plans a satisfactory means of obtaining ample boiling water without the use of electric power.

This hot water service is installed in a room adjoining the releaser room and is used for washing the milking machine and utensils. The heating unit burns either wood or coal and is the same type as that used for household purposes in combination with electric cylinders. The unit is set in concrete and coupled to a 30-gallon copper cylinder which is supplied by a 90-gallon tank installed under the gabled roof 8 ft. above floor level.

This heating unit is 22¾ in. high, 12¼ in. wide, and 14½ in. deep. The fire box is surrounded by a water jacket with two connections to the cylinder for circulation and is constructed to enable easy cleaning; it has a tip and shaking grate and a large ash pan. It is set in concrete 1 ft. above floor level and surrounded with a 3 in. concrete wall. The copper cylinder is installed in a corner of the room, is enclosed on three sides by concrete walls, and is adjacent to the heater as shown in the accompanying diagram. To facilitate access to the cylinder, which is lagged with wood shavings, an asbestos cement sheet is screwed to the front. The sludge plug is fitted to the bottom of the cylinder where a recess is provided in the concrete.



Supply Tank Has Two Outlets

The covered 90-gallon supply tank has two outlets, one to the bottom of the cylinder for recirculation and the other to the bails for washing the cows' udders. The overflow pipe from the top of the hot water cylinder enters this tank just above the water level. The overflow pipe from the cylinder is at one end and the ball-cock at the opposite end of the overhead supply tank. When the water boils the overflow heats the supply water, thus increasing the efficiency of the system by saving fuel and providing warm water for udder washing.

An inch draw-off pipe leads from the top of the cylinder down through the insulating material and out from the cabinet at a convenient height from the floor. A tap is fitted 18 in. from the cabinet and boiling water is drawn off for washing and sterilising the machine. The pipe continues over to a large sink used for cleaning utensils at the wash-up bench, which is quite handy to the unit and under a window.

System in Operation

Mr Reader milks 80 cows with a 4-cow doubled plant and is a cream supplier. The heating unit is lit at the beginning of milking and in 50 minutes the water is boiling vigorously in the cylinder. Fuel consumption varies from 2½ to 3 cords of wood per year, depending on its quality, and two armfuls for each milking is ample to provide abundant boiling water.

The whole system is compact, requiring only 6 sq. ft. of floor space; there is no untidiness in the vicinity of the unit, as the main wood supply is kept in a detached shed convenient to the room.

An efficient hot water system has an important bearing on the production of high-quality dairy produce, and a system such as Mr Reader's has much to commend it for its simplicity and efficient and economical operation. It can be recommended to those experiencing temporary electric power shortages.

[*White's Aviation*

History of Fruitgrowing in Nelson

THROUGHOUT the long history of commercial fruitgrowing in Nelson growers have sought to combine in their efforts to improve their lot and advance their industry and so build up something of value to the community. In the concluding section of this article, which began in last month's "Journal", fruitgrowers' organisations, fruit handling, marketing, and processing, and research into growers' problems in Nelson are discussed. The author is N. J. Adamson, Horticultural Superintendent, Department of Agriculture, Nelson, who has had a long association with fruitgrowing in the province.

SMALL groups of growers in more or less distinct communities formed associations in the early part of the century when locally grown fruits were becoming more plentiful and marketing problems were being met. No fewer than eight small associations were in existence in 1910, at Nelson, Brightwater, Stoke, Motueka (2), Lower Moutere, Ngatimoti, and Upper Moutere.

Later, when the new areas began to develop, other associations sprang up. There were also several fruit-packing groups, which became affiliated with the New Zealand Fruitgrowers' Federation Ltd., formed in 1916. Though packing groups affiliated to the federation no longer remain and some of the earlier associations have gone, very strong district associations have taken their place. These are most active and through them the majority of growers have representation on the federation.

Existing associations are the Motueka Fruitgrowers' Association, Hills Fruitgrowers' Association, Mahana Fruitgrowers' Association, Redwoods Valley Fruitgrowers' Association, Waimea West Fruitgrowers' Association, and Stoke Fruitgrowers' Association.

Fruit Advisory Committee

Under the constitution of the New Zealand Fruitgrowers' Federation provision is made for the setting up of fruit advisory committees in each fruitgrowing district served by a branch of the federation. These committees form a very important link between the federation's board of directors and the individual fruitgrowers in each province. The Nelson Fruit Advisory Committee has been a very active body since its inception and acts as the mouthpiece for the province in promoting, fostering, and protecting the fruit industry.

The Nelson provincial director of the federation has been the chairman of the advisory committee. The present Nelson director, Mr T. F. Archer, is also Dominion president of the New Zealand Fruitgrowers' Federation.

Cooperatives for Packing and Marketing

At various times efforts have been made in Nelson to develop cooperative trading, storage, processing, and marketing among fruitgrowers, especially in the earlier years of the major orchard expansion. However, though most schemes were well conceived, they failed mainly through being premature in that orchards were not sufficiently productive to meet heavy

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HEADING PHOTOGRAPH: Orchards at Upper Tasman. Bluff's packing shed and McKee's packing shed in middle foreground.

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Orchards on typical Moutere Hills country.

overhead expenses and fruit from young trees had not attained good storage and transport qualities, though it was attractive enough when harvested. Bitter pit was invariably present in fruit from young trees and breakdown occurred in storage.

The two most important cooperative fruit-packing and marketing companies formed in Nelson were the Nelson Co-operative Fruit Company Ltd. and the Nelson District Fruitpackers' Ltd., both launched about 1915. The shareholders were the new growers in the particular areas they served. The former company erected packing sheds at Mapua and Tasman and a cool store at Mapua; the latter had packing sheds at Riwaka, Lower Moutere, Port Motueka, Stoke, and Appleby.

The two companies continued packing and marketing until 1920, and the Nelson Co-operative operated its Mapua cool store until 1928 before going into voluntary liquidation. The main purpose of these companies was to provide packing facilities for their shareholders to develop a standard pack and build up a sound marketing scheme. The scheme was voluntary and when it failed for reasons already stated there was a breaking away to individual or small group packing. Though the inability of the cooperative fruit-handling companies to carry on was somewhat of a disaster for individual shareholders, who at this time were feeling the strain of orchard development, the companies achieved something worth while for the districts concerned. They had built several good packing sheds, introduced packing shed equipment, including mechanical graders, lidding presses, etc., and had done much to introduce proper fruit packing methods. The Nelson Co-operative Fruit Company Ltd. had brought an experienced packing shed manager, a Mr Rundle, from British Columbia.

The first mechanical fruit grader used in Nelson appeared in 1911. A "Lomas", it consisted of a series of belts perforated with holes of various diameters corresponding to the range of apple sizes. The belts were assembled at different levels in a series of steps, the fruit travelling over the first belt containing 2 in. holes, then to the second belt with 2¼ in. holes, and so on. Fruit after dropping through the holes was channelled to side bins.

The machine, operated manually, was slow but reasonably accurate. For early export shipments referred to previously, grading and sizing were done by hand and frequently the whole of the packing and stencilling of shipping marks, etc., was done in the orchards.

Cool Storage

In the December 1911 issue of the "Journal" the Assistant Director of the Horticulture Division, Mr W. A. Boucher, called attention to the desirability of establishing fruit cool stores in New Zealand to extend the marketing period for apples and pears and to provide for produce from the extensive planting then going on.

In fostering fruitgrowing the Government made finance available under the Fruit Preserving Industries Act 1914 to assist in establishing fruit-preserving factories, fruit cool stores, and packing sheds. The total amount available in one year was £25,000, individual loans being limited to £9,000.

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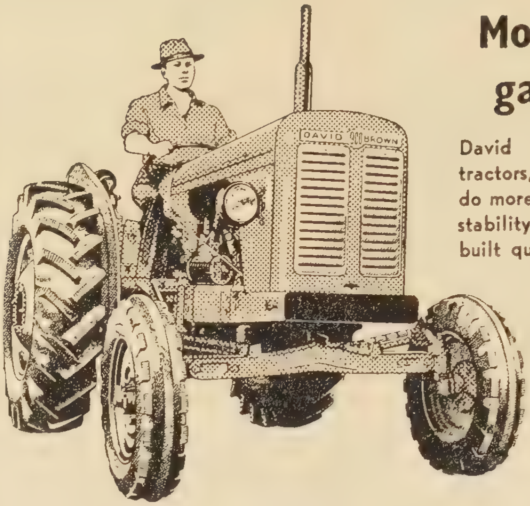

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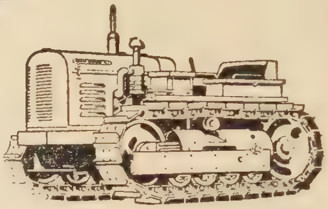

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Fruit-inspection and assembly depot at Mapua.

Under this plan the Motueka Cool Storage Co., a cooperative organisation, was formed and built a cool store with a capacity of 30,000 cases which operated first in 1916. The company added two chambers each with space for 5,000 cases in 1920. Under the same scheme the Nelson Co-operative Fruitgrowers Ltd. built a cool store at Mapua for 25,000 cases. This operated from 1919 to 1927, but was closed when the company went into voluntary liquidation. The building has since been used by the Fruitgrowers' Chemical Co.

The first public fruit cool store in the province was provided by the Nelson Freezing Co. at Stoke. The original store, for 25,000 cases, was opened in 1914 and added to in 1915 to bring the capacity up to 40,000 cases and later to 50,000. In 1951 another extension of 32,000 bushel capacity was provided. A further addition made for the 1956 season brought the total capacity of this store up to 115,000 cases.

The long-established Stoke and Motueka stores have made a noteworthy contribution to the general success of fruitgrowing in Nelson, extending the marketing season for apples and pears and assisting in the assembly of export consignments, particularly direct loadings.

A privately owned store holding 5,000 to 6,000 cases was opened by H. G. Kingsland at Appleby in 1916. It was enlarged to hold 16,000 cases by C. A. Grainger and operated until 1927. In 1931 it was converted to a bacon factory and was used as such for a short time. After the outbreak of war, when more cool storage was needed to assist in the marketing in New Zealand of the whole of the apple and pear crop, this store, now owned by Mr J. Wyllie and known as "Blackbyre", was reconditioned and brought back into use as a fruit cool store in 1941. It was extended in 1947 to hold 22,000 cases and in time for the 1956 season to hold 41,000.

To meet the urgent need after the outbreak of war for further cool-storage space one of the Nelson Harbour Board wharf sheds specially built for holding fruit was converted into a cool store with a capacity of 26,000 cases. This store, operated by the Internal Marketing Division since 1941 and taken over by the Apple and Pear Board in 1954, has proved of great value in export-fruit assembly and for long storage of late varieties.

Mr G. McMurtry built a privately owned cool store on his orchard property in 1931. This store with a capacity of 7,000 cases has been used largely for general purposes in controlled marketing.

Recognising the need for still more cool storage in the province, particularly for the assembly of export shipments for direct loadings, the Apple and Pear Board built a cool store for 40,000 cases near Mapua wharf. This was used first in 1952. Cool-storage space for about 269,000 cases is now available to the marketing authority.

Though at one time cool stores in Nelson were important for maintaining a supply of Nelson fruit on New Zealand markets late in the season, their most valuable function since the resumption of fruit export in 1950 has been in the assembly of export shipments. With more direct loadings this trend must grow and even more space than that added recently to facilitate the handling of the trade will be required. To meet this growing need the Apple and Pear Board in 1956 built a store in Motueka to hold 100,000 cases, but unfortunately this was burnt down in April 1957. However, it has been rebuilt.

Processing Factories

Factories in the province engaged in fruit canning, jam making, and dehydration have done much to provide a ready market for fruit and encourage further production. To a large extent commercial production of stone fruits and berry fruits has been linked with factory activities.

The late S. Kirkpatrick began the manufacture of jam in small premises in Bridge Street, Nelson, in 1881, the fruit being mainly surplus produce from farm orchards. Berry fruits were the main supply, though apples, plums, and apricots were provided in their seasons. The "Colonist" of January 1882 referred to the "large" quantity of fruit at the local factory awaiting processing: 702 lb. of apricots, 600 lb. of plums, 30 lb. of strawberries, and 4,120 lb. of apples.

This was the modest start of the well known "K" factory. By 1883 as many as 40 people were employed in the season. In 1900 the factory was moved to more up-to-date and commodious premises in Vanguard Street, its present location.

The factory now has a working area of 50,000 sq. ft., besides a large amount of storage space. Automatic machinery has replaced all the hand work of can making and preserving. There are now more than 300 employees in the season and several million cans of fruit products are distributed annually.

The "K" factory was one of the pioneers in its field. Before its establishment much of the jam and canned fruit came from Tasmania. The widely distributed "K" products have done much to publicise Nelson as a fruit district.

In 1926 the Nelson Fruitgrowing and Development Co. Ltd., a subsidiary of the "K" factory, planted extensive orchards in Motueka to ensure supplies of peaches and pears for the factory

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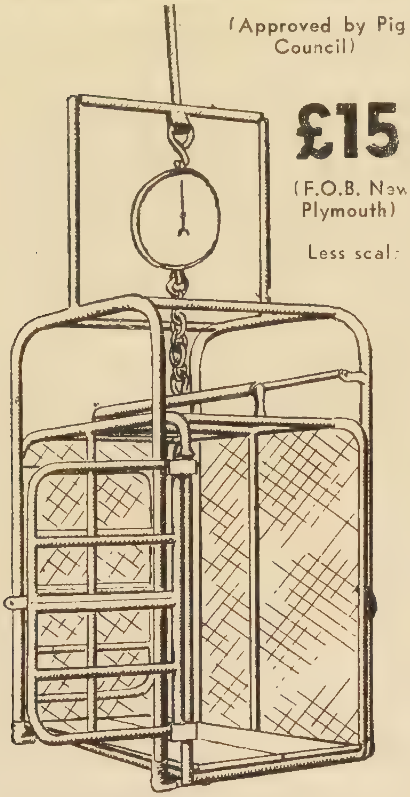

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The New Zealand Fruitgrowers' Federation premises in Nelson.

for canning. The area at one time was 170 acres, but has been reduced. The main fruits grown are Williams Bon Chretien pears and late varieties of canning peaches. The company's large peach orchard, on "The Island" at Umukuri, is one of the attractions for visitors to the district during blossoming and when fruit is reaching maturity.

Jam was made in a small factory at Pangatotara in the Motueka Valley in the 1880s, most of the fruit for it coming from a mixed orchard planted by B. Lloyd in the late 1870s. Other factories which functioned for a period and were closed and some which are still operating have helped fruitgrowing to develop.

The Motueka Co-operative Fruitgrowers' Society's factory at the old Motueka wharf operated from 1902 to 1913. Raspberry pulping was the main activity there, but fruit canning and jam making, mostly in 7 lb. tins for bakers, was also undertaken. In 1904 this factory handled 1,200 tons of raspberries and sent 583 tons of pulp to London. The demand for raspberry pulp diminished and the factory closed in 1913.

Three other processing concerns are still operating at Motueka. Thompson and Hills Ltd. started sulphurising and pulping raspberries at Motueka in 1913 and are still doing so. In 1922 apple drying was included in their activities and was continued until shortly after the beginning of the Second World War, when the Internal Marketing Division took over the plant for supplying the armed forces until the Division's own dehydration factory was in operation. Thompson and Hills's factory continued to process raspberries, currants, gooseberries, and stone fruits from growers in the Motueka and Riwaka districts. On several occasions this firm has imported raspberry canes and currant bushes for distribution among growers with a view to increasing and improving local crops.

Irvine and Stevenson of Dunedin (now Irvine and Stevenson's St. George Co. Ltd.) began fruit processing in Motueka in 1899. The original premises were in the old brewery buildings in the main street. The firm had purchased the New Zealand rights for what was then a new patented process in Australia for preserving fruit in barrels with sulphur dioxide gas. Before this raspberries preserved in tins were being imported from Australia.

In 1906 the company moved to a new site close to the old wharf and in 1916 to the building at present occupied in Massey Street. Apple drying was started in 1916 and was continued for some years. In the present building a variety of fruits is canned and raspberries are pulped for dispatch to Dunedin for jam making.

Thompson and Hills's and Irvine and Stevenson's factories have assisted greatly in keeping the berry fruit growing industry alive in the Motueka district and have also provided a useful outlet for quantities of stone fruits.

The Marketing Department's processing factory in High Street, Motueka, now operated by the New Zealand Packing Corporation Ltd., was built in 1943 and operated first in 1944. It was designed for the dehydration of apples for the armed forces and had been used mainly for apple dehydration until taken over by the corporation.

In the first year 1,800,000 lb. of apples were dried. In 1952 the quantity of fresh fruit processed was 3,100,000 lb. Since then the average yearly output has been 300,000 lb. of dried apples and the maximum 400,000 lb. The factory has been a valuable adjunct to the apple growing industry in providing an outlet for certain varieties and grades and in relieving packing sheds at a very busy period. Besides this the factory provides an acceptable alternative product when fresh apples are difficult to obtain.

A small fruit-canning works also operated at Stoke between 1913 and 1923. During the First World War there was a demand for these goods, but when it fell away in the early 1920s the works closed.

Fruit Research

As a result of research by the Department of Scientific and Industrial Research and the Cawthron Institute, assisted greatly by the advisory service of the Horticulture Division of the Department of Agriculture, some serious local fruitgrowing problems have been overcome and growers have attained a high degree of efficiency in production and preparation of fruit for export and local markets.

A major early problem for hundreds of new growers on the Moutere Hills was the poor growth of trees planted in soil of low fertility. These growers lacked knowledge of soil requirements and often could not afford to buy lime, fertilisers, and seed for cover crops.

A study of the Moutere soils and manurial requirement of orchards was one of the first undertakings of the Cawthron Institute after its foundation in 1920. This was carried out under the leadership of T. (now Sir Theodore) Rigg, who later became the institute's director, a position from

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which he retired recently. It was quickly shown that soil was lacking in lime, available phosphate, nitrogen, and organic matter, and that a manurial programme would have to provide for all these deficiencies if good tree growth were to be secured.

Recommendations made at the time were: (1) Liming at the rate of 2 tons of ground limestone per acre (at the end of every fourth year an additional ton would be required). (2) The growing of a leguminous cover crop during the autumn and winter, cover crops to receive superphosphate drilled in with the seed at 5 cwt. per acre. (This would be repeated in alternate years.) (3) The application each year in spring around the trees of 2½ lb. of superphosphate and ½ lb. of ammonium sulphate or nitrate of soda per tree. It was estimated that the average annual cost would be £4 2s. per acre for materials.*

At this time many new settlers lacked the finance to carry out the recommendations. As a result of deputations to the Government in September 1922, £5,000 was allocated for the purchase of lime and manure for orchards on the Moutere Hills. It was made available as loans for 5 years, interest and principal to be repaid in half-yearly instalments. Loans could be used only for the treatment of trees 7 years old or older, it being reasoned that bearing orchards required immediate help while the younger trees would continue growing as long as they received the necessary cultivation.

The late James Allen of Tasman advocated this scheme and was largely responsible for organising the service to growers. This was a turning point for many orchards, as it gave fresh impetus to tree growth and renewed the hopes and enthusiasm of growers.

For many years woolly aphis had been a severe pest on apples and on the great area of young orchards was a serious handicap in the growing of certain varieties favoured for export and of which there had been heavy plantings in the boom years. In 1921 Dr R. J. Tillyard, Entomologist of the original staff of Cawthron Institute, successfully introduced the woolly aphis parasite *Aphelinus mali*, which quickly became established in Nelson orchards and was later distributed in other fruitgrowing centres. The control of woolly aphis saved the apple industry, as it permitted the growing of valuable export varieties which later built up a reputation for New Zealand apples. Woolly aphis is no longer a major problem in apple orchards and spraying is seldom necessary for it.

Good progress was now made and Nelson Province shipped its first 1,000,000 cases of export apples in 1934. However, this total was not approached again until 1938, as a new problem causing loss of crop was facing the Moutere Hills growers. This was internal cork or corky pit of apples, which was becoming widespread and increasingly severe. The problem was investigated by J. D. Atkinson (now Director, Fruit Research Station) in experiments in which the Department of Scientific and Industrial Research and Cawthron Institute cooperated.

The trouble was found to be due to a deficiency of boron, which could be rectified by applying small dressings of borax to the soil or in the regular sprays. Since then the standard practice had been to apply powdered borax at ½ lb. per tree or to include 1 lb. of the material in each 100 gallons of sprays applied in early November and 3 weeks later, when trees have reached full foliage development.

Research Orchard at Appleby

In 1930, 63 acres (20 acres of bearing apples and 43 acres of scrubland) were purchased from H. Edyvean at Appleby to form the Appleby Research Orchard controlled by the Department of Scientific and Industrial Research. The Empire Marketing Board offered £2,000 toward capital expenditure and £1,500 for 4 years for maintenance. The Government agreed to pay £1,500 for 4 years as a subsidy on an equal amount provided by the board. A Dominion conference of fruitgrowers agreed to contribute £1,250 toward the purchase and the Government agreed to grant £810 toward capital expenditure. The growers' contribution was met by the Fruit Export Control Board.

The orchard, developed on typical Moutere Hills country, has been of considerable value to Moutere Hills growers, especially for the manuring trials conducted over the past 25 years. Results of trials on sprays have had Dominion-wide application. Rootstock experiments have given growers a lead on suitable types for new plantings. Recent extensions have been made to the orchard, including a contour-planted area which should give a good lead to future planting on slopes subject to erosion.

Present and Future

The most important aspect of fruitgrowing in Nelson is apple production with export as a main objective as it has been since the early 1920s. Orchards were planted to produce fruit for export and varieties grown have been limited mainly to those suitable for overseas markets.

Early experience in grading to standards and in fruit packing has enabled growers to become efficient in preparing fruit for markets, particularly in export packing. They have developed very highly their fruit handling techniques. A recent development and one which has spread to other fruitgrowing districts in New Zealand and overseas is bulk harvesting.

In this practice picking boxes are replaced by large trailer bins holding from 50 to 80 bushels into which picking bags are emptied. Trailer bins are drawn by tractor to the packing shed, where the fruit is fed directly into grading machines, thereby greatly reducing handling. Orchards are highly mechanised and the very latest types of spraying equipment are used throughout the province.

Apple and pear production has been maintained at a high level over the past 7 years, with an upward trend.

		Apples cases*	**Pears** cases*	**Total** cases*
1950	..	1,425,066	103,898	1,528,964
1951	..	1,475,911	174,126	1,650,037
1952	..	1,232,654	114,778	1,347,432
1953	..	1,216,185	146,492	1,362,677
1954	..	1,373,379	108,961	1,482,340
1955	..	1,511,754	200,241	**1,711,995**
1956	..	1,471,482	164,692	1,636,174

* About 40 lb. net.

The bulk of Nelson fruit comes from trees 40 to 50 years old, but there is no apparent decline in overall production from these trees, though deaths of trees through phytophthora root rot is becoming high in some varieties, especially Cox's Orange.

Since the extensive plantings of 1911 to 1916 relatively few pip fruit orchards have been planted. After the Second World War fruit trees were not available for extending orchards and very few were available for replacements. However, in recent years replacement and filling of gaps have proceeded apace and though no entirely new units have been established, small extensions to existing orchards are being made. As a result it is suggested that with new trees coming into bearing, apple and pear production could reach 2,000,000 bushels in 10 years.

The 1953 New Zealand orchard survey—the last made—showed that there were 54,000 apple and pear trees up to 5 years old in Nelson Province at that time. Up to 30,000 new trees have been planted each year over the past 3 or 4 years.

With the development of Port Nelson proceeding as planned and extensions being made to fruit-handling facilities it is expected that Nelson will be better served with direct loadings of fruit on to overseas vessels. This, with more adequate cool storage space now being provided in the district to cope with the assembly and storage of export consignments, should result in Nelson growers retaining a preeminent place in export of fruit and contributing largely to the prosperity of the pip fruit industry of the Dominion and the general prosperity of Nelson Province.

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* "Soil Problems of the Moutere Hills", by T. Rigg and L. Tiller, Australasian Association for the Advancement of Science reports, vol. 16, pp. 809-811 (1923).

Pole Planting Against Erosion

WILLOWS and poplar poles are planted in many North Island districts to control or prevent erosion. In this article E. H. H. Kelman, Soil Conservator, Departmore of Agriculture, Gisborne, gives some practical pointers on ensuring success with this work.

THE first essential is to get good planting material. Poles taken from trees that are not thriving do not give good results. They should have smooth, healthy bark, and old material on which moss is growing should not be used. The best material is the regrowth from trees that have had all their branches cut off or material specially grown in small, fenced nurseries. In this way delays between cutting and planting are avoided and the total cost is reduced.

Poles to be planted are generally 8 to 10 ft. long and 3 to 4 in. in diameter at the base. They should be firmly planted at least 2 ft. 6 in. in the ground and should be rerammed if they become loose.

Delays between cutting and planting should be avoided. The best time to plant most varieties is during June and July, though willows still give good results in August where planted alongside water.

Damage by Pests

Where opossums or goats are a problem they should be controlled. Poles will not survive where goats can damage them, but much can be done to overcome some opossum damage by choosing species not so susceptible to damage, such as silver poplar and pussy willow. The ordinary golden willow, which is the most susceptible to damage, should not be planted in infested areas.

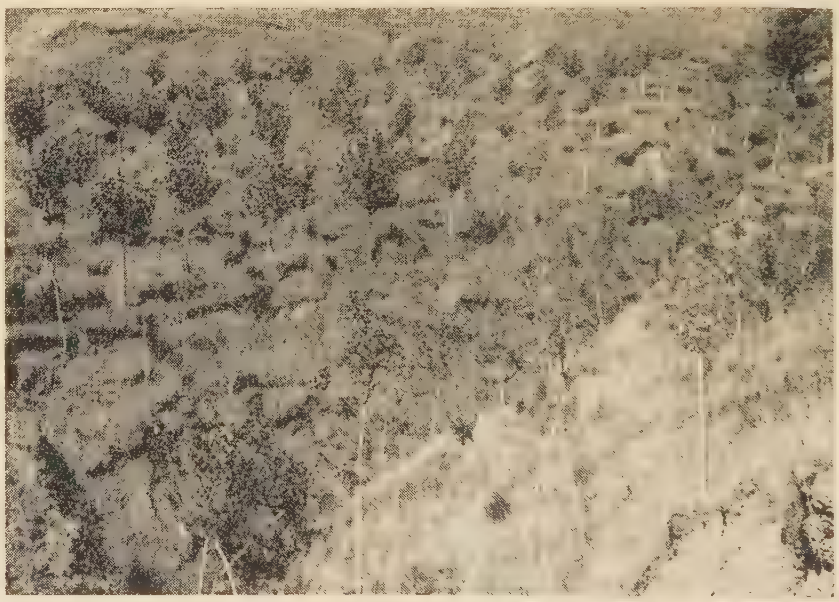
Silver poplar and pussy willow are listed noxious weeds and a check should be made before they are planted to see that they have not been declared so by the local authority.

Varieties to Plant

The varieties planted should be suitable for the particular site and the job they will have to do. Willows are generally more suitable for planting on very wet sites and alongside streams and water channels in the hills, where their fibrous root system is required to prevent gully erosion.

Well planted poles. Good planting material from suitable varieties was obtained from a fenced-off nursery near the planting site.

▼ The same poles 20 months later. These trees are hybrid poplar varieties and pussy willows, which are not as susceptible to opossum damage as other varieties. The farmer has taken precautions to prevent cattle damage and has excluded horses.



Of the common varieties pussy willow is recommended for colder and drier conditions, while the golden willow makes the fastest growth of all species on the very best sites. The common crack willow thrives in a wide range of conditions.

Poplars, particularly some of the faster growing hybrid types such as *robusta* and *generosa*, are generally preferred on the slopes. The Chinese or Yunnan poplar is suitable on sites which dry out badly and silver poplar, which does not strike so readily and is slower in establishing, is a species that may be planted to control advanced gully erosion.

For further information on varieties to plant, spacing, and care against pests and stock the local catchment board or soil conservation staff of the Department of Agriculture should be consulted.

Photographs supplied by courtesy of Poverty Bay Catchment Board.

The Home Orchard in Autumn

By D. W. McCALLUM,
Horticultural Instructor,
Department of Agriculture,
Blenheim

HOME orchardists are in a different position from commercial growers in respect to the harvesting and storage of fruit crops. The commercial grower, obliged to consider transport and long storage of his product, must harvest it earlier than the home orchardist, who is not so much concerned with these considerations and will be looking for the best quality and flavour in his fruit. As flavour usually improves with maturity, he is able to a certain extent to allow fruit to remain on the trees longer and harvest as required. This article suggests suitable simple tests to ensure harvesting in good condition, for both immediate use and for storage, of the main kinds of fruit and also discusses routine work in autumn.

[National Publicity

RIPENING of fruit is a complex chemical process, but the main obvious features are the conversion of the starches into sugars, which make the fruit more palatable, and the development of characteristic colour. Methods of determining the best stage to pick vary according to the kind of fruit and the purpose for which the fruit is required. These points will be discussed later.

All fruits have one feature in common; the development of a special layer of cells in the stem called the abscission layer. Production of flowers and fruit was not designed to provide mankind with food; the sole purpose was for the reproduction of the particular plant involved. To assist in reaching this end the abscission layer develops as the fruit ripens, and when the fruit is fully ripe this layer causes the stem of the fruit to part with the bud from which it grew and the fruit drops. In general, therefore, when the fruit is readily picked by lifting it gently with a slight twist the abscission layer is well developed and the fruit is ready to harvest.

Storage

Only healthy fruit should be stored. Insect-damaged fruit or fruit which has been attacked by fungous diseases which penetrate the skin is likely to break down rapidly after harvest and should be set aside for immediate use. Similarly, damaged fruit should not be stored and fruit at all stages should be handled with the greatest care. Apart from bruising, two of the main causes of damage in fruit handling are stem punctures caused by the stems of adjacent fruit piercing the flesh and cuts caused by fingernails.

Stored fruit should be checked over periodically and any showing signs of collapse should be removed.

Apples

Early varieties of apples, which mature until about mid February, do not keep well and should be stored for short periods only. Provided they do not start dropping they are possibly best left on the tree, only sufficient for 2 or 3 days' use being picked at one time. Most varieties maturing after mid February have some storage life.

When apples are required for immediate consumption flavour is all important and is fully developed if fruits are left on the tree until the abscission layer is nearly fully developed. There are exceptions to every rule, of course, and Cox's Orange and Delicious should not be left until they are about to drop or the flavour will have passed its best and the fruit will have lost its crispness. For these varieties the ground colour development, which is discussed later in this article, is a good guide. The pips in a ripe Cox's Orange rattle when the apple is shaken vigorously.

With late-maturing varieties, such as Rome Beauty, Granny Smith, Sturmer, and Dougherty, the abscission layer does not form until well into June or even later. The fruit may quite well be left on the tree until the first frosts have occurred, when the flavour and crispness of the fruit will be enhanced by the low temperatures to which they have been subjected.

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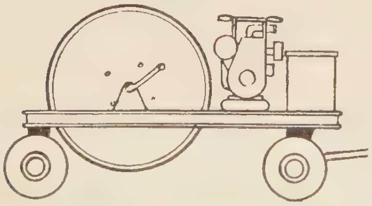

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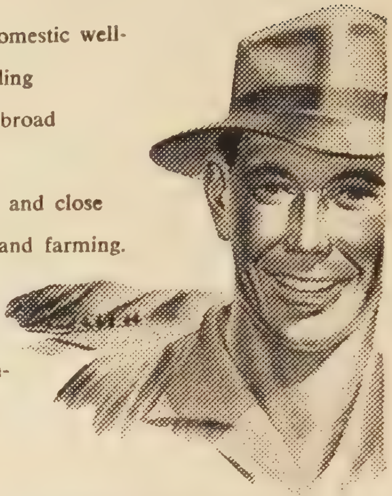

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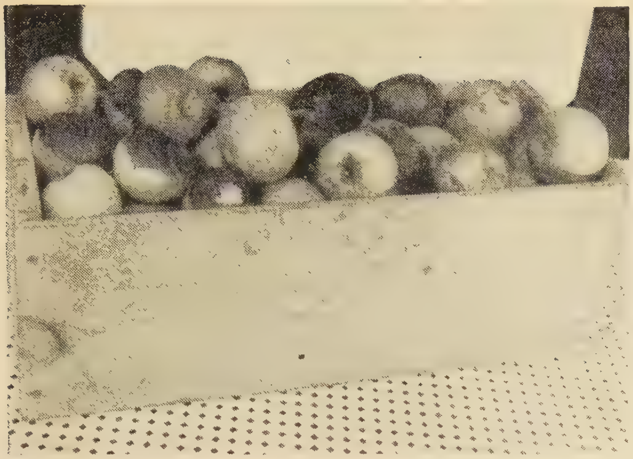
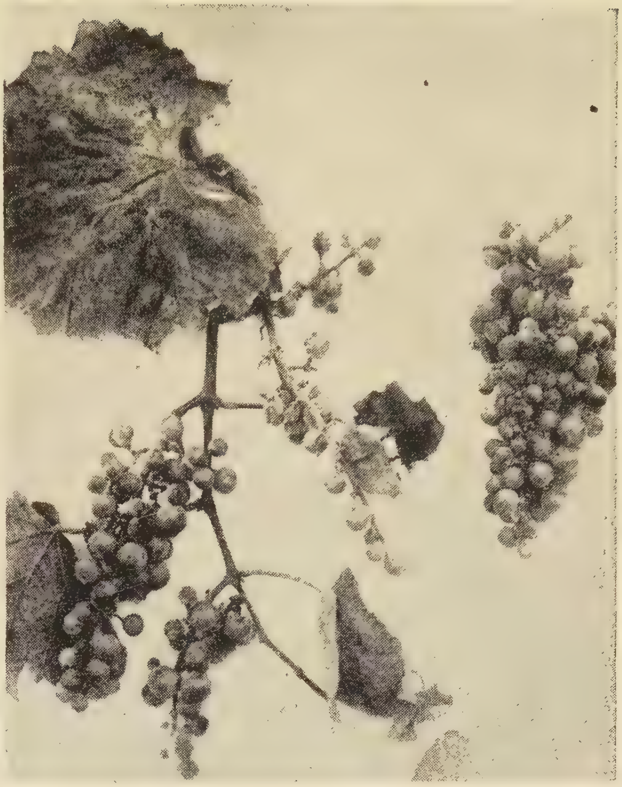


Unwrapped apples stored for several months will wilt and any fruit developing rot is likely to affect neighbouring fruits.

▼ Wrapping of fruit will reduce wilting and will isolate developing rots.



Grape leaves and fruit affected with powdery mildew or oidium, which causes the berries to split.

In apples the green or yellowish colours are known as under colours or ground colours while the red is the over colour. For good storage life apples require to be picked before the ground colour changes too much; that is, before the yellow intensifies and the green disappears. Golden Delicious is an exception to this rule and these apples should be allowed to develop their full golden colour before being harvested. Jonathan is another variety which will store quite well for a month or so when picked fully mature though still firm. For most varieties, however, full maturity will reduce storage life. On the other hand immature fruit will rapidly shrivel and will remain woody. All apples on a tree are never at the same stage of maturity and for best results two or three selective pickings should be made with a week or so between each picking. In this way the harvest period will extend over 2 or 3 weeks and every apple can be picked close to its best condition.

The site for storing apples should be carefully selected. A cool, dry, and airy position is most suitable. Direct sunlight and high temperatures must be avoided. Underneath a house or in a well ventilated room on the south side of a house is a satisfactory position. If it is not possible to store indoors, covered boxes on the shady side of a hedge or under an evergreen tree are quite good.

Wrapping of individual fruits in paper will reduce the risk of wilting and will also isolate fruits which may develop rots from sound fruit.

Pears

Most pear varieties can be harvested greener than other fruits and still develop good flavour. The change in ground colour from quite a hard green to a green with a yellowish tinge is a good guide to maturity. In addition the fruit should pick easily and usually colour of the pips has darkened quite appreciably.

Storage requirements are similar to those for apples. One of the most popular varieties of pears grown, Williams Bon Chretien, does not store well and should be used as soon as it ripens. Winter Nelis, P. Barry, and Vicar of Winkfield are good storing varieties.

Stone Fruit

Stone fruit does not store satisfactorily and it is generally a waste of time trying to keep it for more than a week or two after harvest. The development of the ground colour is the most satisfactory guide for the maturity of peaches, nectarines, and apricots. The type of colour varies according to the colour of the underlying flesh. The maturity of plums is best gauged by the texture of the flesh. If it yields to light finger pressure, maturity is approaching.

Stone fruit should not be left on the tree until soft ripe. Rain or humid conditions will induce brown rot very rapidly at that stage and wind will cause serious losses by causing the fruit to drop.

Chinese Gooseberries

Harvesting of Chinese gooseberries should not begin too early, as the full flavour will not have developed. The earliest fruit can usually be picked in May, but harvesting can be continued through to July. This fruit will store well for several weeks. In fact, many people prefer the fruit after it has been kept for some time and begun to soften.

Feijoas

Feijoas mature from mid April. They should not be picked but left until they fall.

Cape Gooseberries

Cape gooseberries ripen in late summer and autumn and are harvested when the husk changes to a light straw colour. At this stage the berry is bright yellow. Frequent pickings are necessary if the fruit is to be obtained in the best condition.

Seasonal Work

Berry fruit: Most berry fruit carry many of their feeding roots close to the surface of the soil. For this reason cultivation should never be deep and every effort should be made to kill weeds in the seedling stage by shallow hoeing and mulching. Though most fruit will have been harvested by now, plants still require attention and in particular the soil should not be allowed to dry out. Healthy and vigorous plants in autumn presage a good crop the following summer. A watch should be kept for aphids and if they are found, lindane or malathion will give satisfactory control.

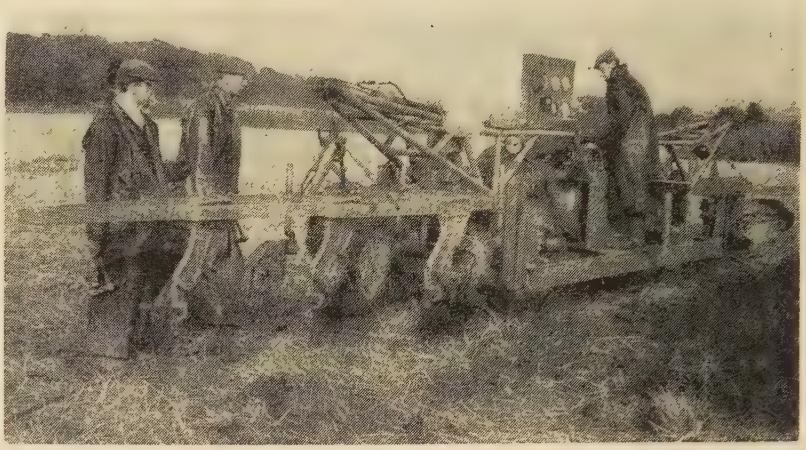
Citrus: Moisture supplies are all important with citrus too, and during protracted dry spells the ground should be soaked. If a mulch was applied earlier in the season, moisture will have been conserved and the need for supplementary watering reduced. Any mulch applied must be maintained, as surface rooting is encouraged by mulching and its removal would most certainly give the plant a severe check.

A build-up of scale insects can be prevented by spraying with summer oil (4 fl. oz. to 1 gallon of water) plus nicotine sulphate (1 teaspoon to a gallon of water) in late February. The oil spray should be repeated in 2 to 3 weeks. In early autumn a bordeaux or bordeaux substitute (copper oxychloride) spray will check the development of several fungous diseases.

Grapes: Powdery mildew, or oidium, can be a problem on developing fruit. Wet sprays are not usually advised at this stage because of the unsightly residue, but to the home gardener this is probably not important. If a wet spray is desired, 40 per cent colloidal sulphur (2 oz. to 4 gallons of water) may be used; otherwise dusting with flowers of sulphur is satisfactory.

The trouble is most severe under warm, humid conditions and appears as a dusty greyish film on the upper surfaces of leaves.

Ploughing by Electric Tractor



THE first demonstration of an electrically powered tractor took place in Scotland recently and proved that ploughing by electricity is feasible. In the illustration above the tractor, looking complicated and modern in design, is shown during the demonstration.

The idea of an electrically powered tractor occurred to Major A. McDowall, a Scottish farmer, some 30 years ago. It was only in the last few months that the main problem of getting suitably low speed and high torque hydraulic motors mounted directly in the driving wheels was solved.

The electrically powered tractor can be run at a cost comparable to that of an oil-driven one. It is "just a mobile test bed" at present, but it is hoped that it will be a great step forward in the further mechanisation of agriculture.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:

NORTH ISLAND

February

19 February—Matamata A. and P. at Matamata.

*20 and 21 February—Masterton A. and P. at Masterton.

20 and 21 February—Te Kuiti and District A. and P. at Te Kuiti.

20 and 21 February—Franklin A. and P. (70th Annual Show) at Pukekohe.

21 February—Waiapu P. and I. at Ruatoria.

21 February—Northern Wairoa A. and P. at Mititai.

21 February—Whakatane A. and P. (50th Jubilee) at Whakatane.

25 February—Morrinsville A. and P. at Morrinsville.

27 and 28 February—Wellington and Hutt Valley A. and P. at Trentham.

27 and 28 February—Ohura A., P., H., and I. at Nihoniho.

*28 February—Waimarino A., P., H., and I. at Raetihi.

28 February—Putaruru A. and P. at Putaruru.

28 February—Te Puke A. and P. at Te Puke.

March

7 March—Waiotira Junction A. and P. at Waiotira.

*7 March—Mangonui County A. and P. at Kaitaia.

7 March—Albany A. and P. at Albany.

7 March—Tauranga A. and P. at Tauranga.

14 March—Kumeu District A. and H. at Kumeu.

20 and 21 March—Wellsford A. and P. at Wellsford.

21 March—Poverty Bay Autumn Carnival at Gisborne.

SOUTH ISLAND

February

*21 February—Maniototo A. and P. at Ranfurly.

21 February—Murchison A. and P. at Murchison.

*28 February—Kaikoura A. and P. at Kaikoura.

March

7 March—Mount Benger A. and P. at Roxburgh.

7 March—Temuka and Geraldine A. and P. a Winchester.

7 March—Amuri A. and P. at Rotherham

*14 March—Cheviot A. and P. at Cheviot.

14 March—Upper Clutha A. and P. at Wanaka.

14 March—Mayfield A. and P. at Mayfield.

21 March—Methven A. and P. at Methven.

*21 March—Hawarden A. and P. at Hawarden.

30 March—Strath Taieri A. and P. at Middlemarch.

30 March—Mackenzie County Highland Show a Fairlie.

April

4 April—Oxford A. and P. at Oxford.

11 April—Malvern A. and P. at Sheffield.

* The Department of Agriculture exhibit will be staged at this show.

Wintering Cows on Autumn-saved Pasture

A POLICY of spelling a large area of the dairy farm in autumn to provide adequate saved pasture for the newly calved cows at the start of the new season was recommended by L. R. Wallace, Senior Principal Scientific Officer, Department of Agriculture Ruakura Animal Research Station, in a paper given at the 1958 Ruakura Farmers' Conference. In discussing an experiment on the feeding of autumn-saved pasture Dr Wallace suggested that large quantities of valuable autumn feed should not be wasted on cows reaching the end of their lactation. It would be better to restrict grazing then and to compensate by feeding out silage. An adaptation of Dr Wallace's paper follows.

TODAY in the more progressive dairying areas there are few farmers who do not make some use of autumn-saved pasture and also on an increasing number of farms it provides the main or even the sole feed for the herd for some 6 to 8 weeks about the time of calving. With the many ingenious semi-permanent electric fencing systems now available these saved pastures can be fed off most efficiently with the minimum of labour.

However, despite its great importance in practice, few critical studies have been made of the value of this type of pasture for body maintenance, weight gains, and milk production, though digestibility trials have shown that utilised at the right stage of growth, autumn-saved pasture is extremely nutritious. Most published recommendations as to the amounts to be fed refer to the use of the pasture in conjunction with silage and hay. However, in the winter of 1957 at Ruakura we had available a large acreage of autumn-saved pasture and this was used to determine its value when fed alone without supplement of any kind. I intend to describe in detail just what was done and the results, to provide a few facts on which methods of making the best use of winter pastures on dairy farms may be discussed.

Plan of Experiment

Thirty-six sets of identical twins were used. For some weeks before the start of the experiment they were liberally fed, being rotationally grazed as a single herd over pastures which had been spelled from grazing for some 5 to 8 weeks. Then, on 29 May they were divided to make up 4 balanced groups each of 18 animals. During the next 6 weeks before calving began, 11 paddocks which had been rested for from 7 to 12 weeks were grazed off in rotation, the animals spending from 2 to 6 days in each paddock. The paddocks were rectangular and before grazing each was divided into four parallel strips the areas of which were in the ratio of 100 : 85 : 70 : 55 (see Fig. 1 on page 183).

Each group of cows was given a fresh break each morning at about 7 o'clock. Back grazing was not permitted. The break areas given the

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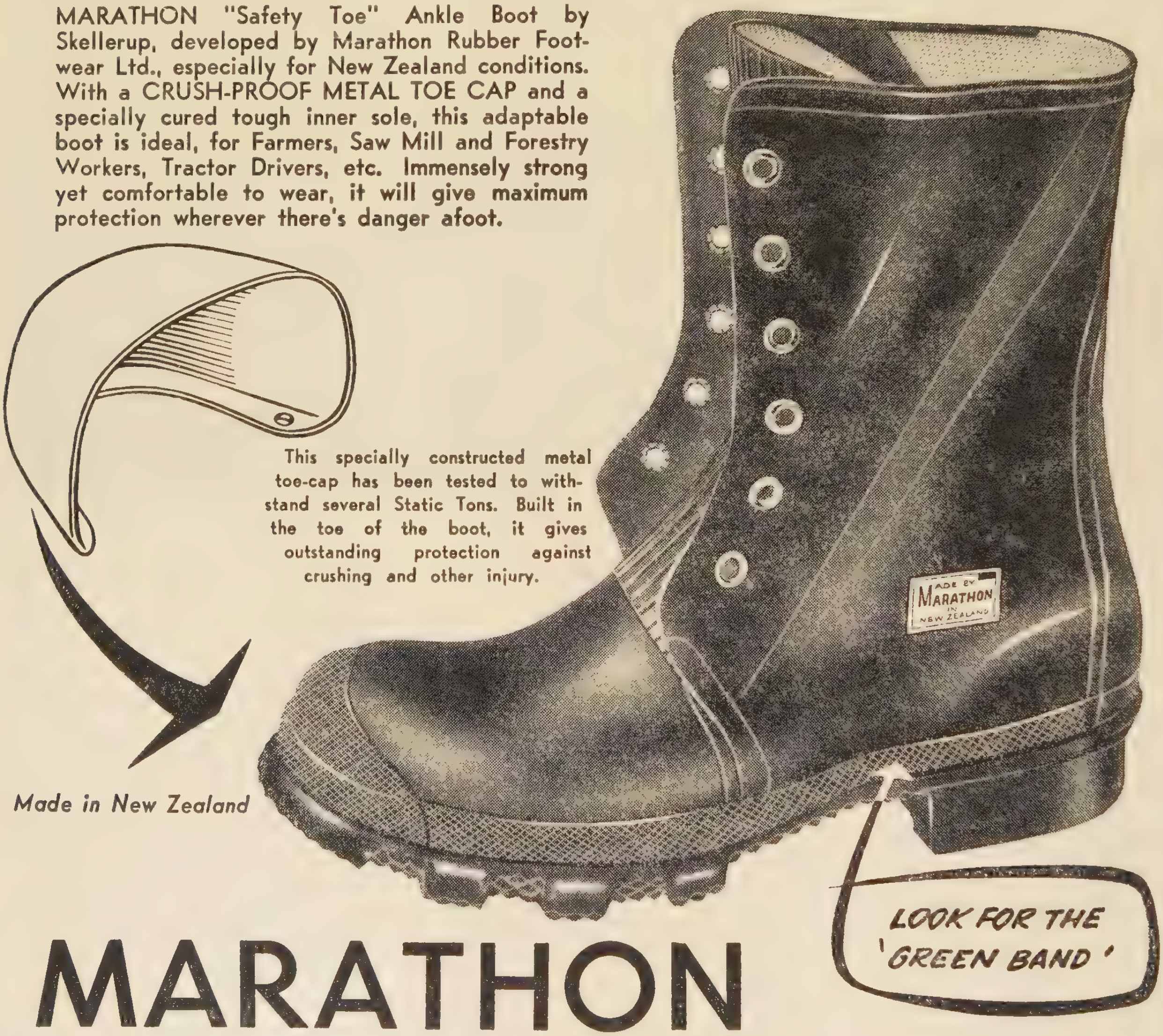

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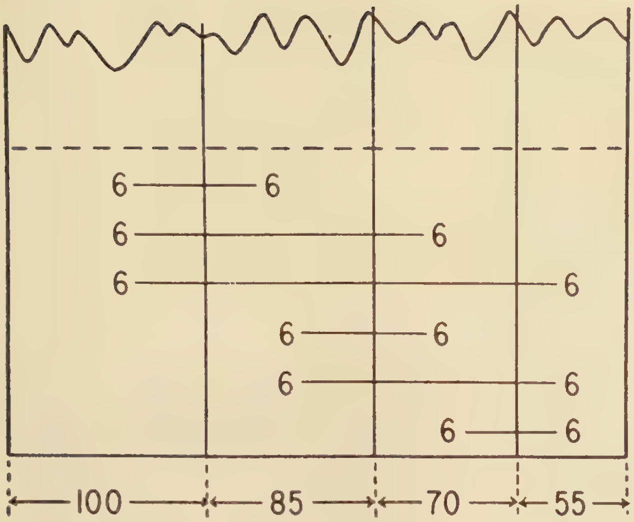

Fig. 1—Design of experiment, showing how each paddock was divided into 4 parallel strips, the areas of which were in the ratio of 100 : 85 : 70 : 55. Each of the four balanced groups of 18 animals was placed in one of the strips as shown. The line between each 6 animals indicates how the identical twins were split between groups.

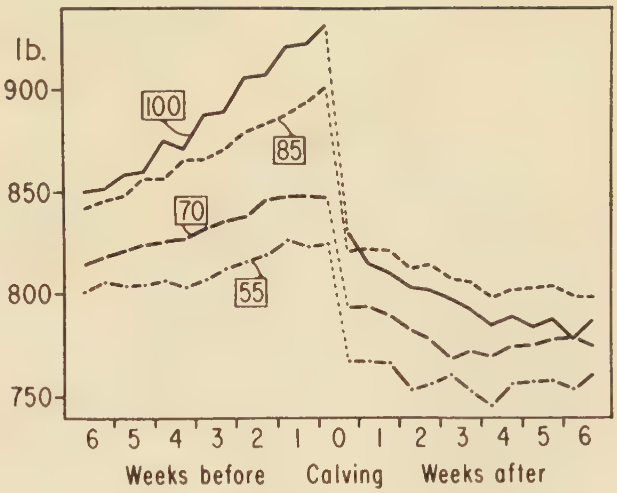

Fig. 2—Liveweight changes before and after calving.

groups were always in the ratio of 100 : 85 : 70 : 55. The actual size of the areas allowed was determined by the requirements of the 100 per cent group. With this group the aim was to provide each day just that amount of pasture which the cows could comfortably clean up in 24 hours, overgrazing and excessive waste both being avoided, and in general leaving a cover of approximately 2 to 3 in. on the area after grazing.

The 100 per cent group was not fully fed in the sense that the cows would probably have eaten more had they been allowed greater selection. They were, however, allowed as much as they would eat and as would at the same time leave the area in good order for recovery after grazing. It should be emphasised that the cows of this particular group remained on their break throughout the 24 hours except when taken to the shed each morning and evening, which was necessary in order to apply the method whereby the intake of each cow was measured.

With the 85, 70, and 55 per cent groups the procedure followed differed from that with the 100 per cent group in that each of these groups was transferred off the pasture to a thoroughly bared holding area as soon as their breaks had been grazed down to the same condition as that in which the areas of the 100 per cent group were normally left after grazing. Usually the cows of the 55 per cent group had to be removed first, followed in succession by those of the 70 per cent and 85 per cent groups.

Records were kept of the times at which the different groups entered and left their breaks, and some general observations made of their grazing behaviour.

This method of feeding was continued right up to the time of calving. For the first 2 months after calving all cows were grazed together as a single herd on abundant pasture, no supplementary feed of any kind being fed. Unfortunately at the end of the second month the trial had to be stopped, as the animals were required for another experiment.

Records Secured

Throughout the trial the cows were weighed twice a week. After calving the milk was weighed each morning and evening and the butterfat percentage of the milk was determined twice a week. In addition the feed intake of each cow was measured regularly each week.

The basis of the method used for measuring intake is that each cow is dosed morning and evening with a capsule containing a known weight (about ⅓ oz.) of a very finely divided, completely indigestible chemical powder. If a cow is eating a lot of grass, the powder will become mixed with a lot of dung and its concentration in the dung will be low. If, on the other hand, the cow is eating very little grass, and hence passing only a small quantity of dung, the concentration of the powder in the dung will be relatively high. By dosing the cows regularly and analysing their dung it is thus possible to calculate the amounts of pasture eaten.

Results

Liveweight Changes

The liveweight changes before and after calving are shown graphically in Fig. 2.

During the last 5 weeks before calving the cows of the 100, 85, 70, and 55 per cent groups increased in liveweight at the average rates of 2.0, 1.4, 1.0, and 0.6 lb. per day respectively.

Digestible Nutrients Eaten

Pasture usually contains quite a lot of water, often as much as 80 per cent or more of the weight of the fresh herbage. The remainder is dry matter, but about 10 per cent of this consists of minerals which provide no energy to the animal. The rest of the dry matter consists of organic matter such as carbohydrates, fats, and proteins, but of course not all the organic matter eaten by the animal is utilised; some passes through the animal without being digested and absorbed and is voided in the dung. It is the organic matter that is digested that is useful to the animal and in the present trial intakes have been measured in terms of pounds of digestible organic matter (D.O.M.).

The average daily D.O.M. consumption of the four groups during the 5 weeks from 4 June to 9 July is given in Table 1.

TABLE 1—AVERAGE LB. D.O.M. CONSUMED PER DAY DURING 5 WEEKS
(4 June to 9 July)

	Groups			
	100 per cent	85 per cent	70 per cent	55 per cent
D.O.M. (lb.)	13.8	12.33	10.89	8.95
Ratio ..	100	89	79	65

Though every effort was made to ensure that the cows grazed down their breaks to the same extent, the intakes were not in exactly the same proportion as the areas grazed. Using the 100 per cent group as a basis for comparison the cows of the 55 per cent, 70 per cent, and 85 per cent groups all

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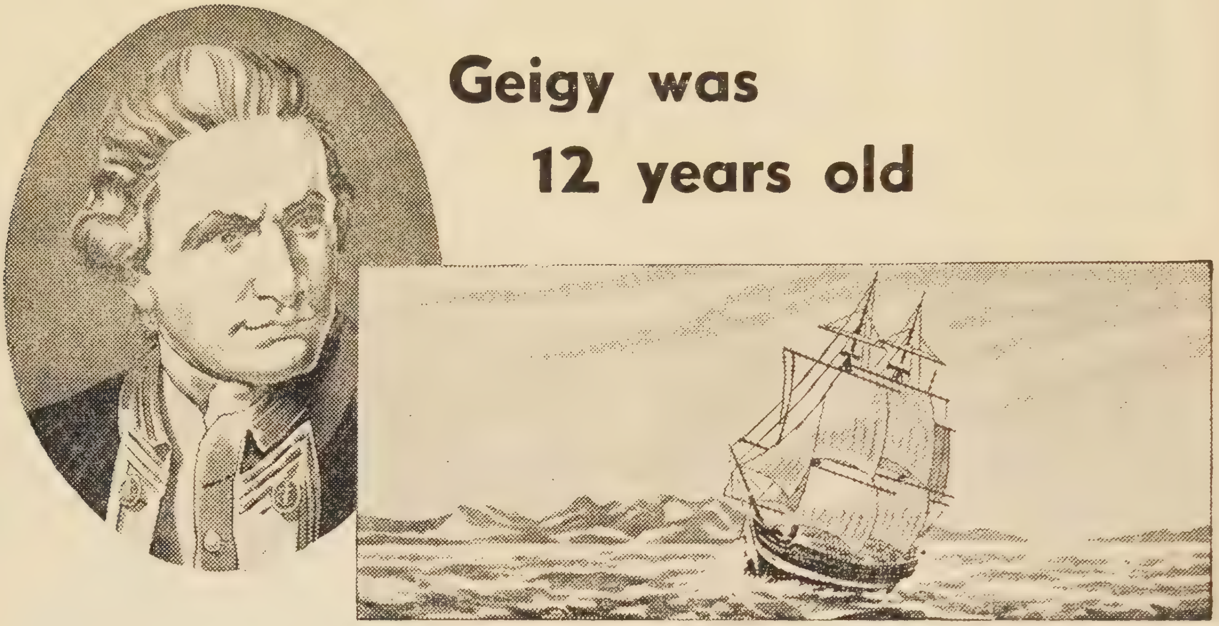

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ate relatively more than was expected in view of the grazing plan followed.

Grazing Records

Size of the breaks: Over the 5 weeks between 4 June and 9 July the average areas grazed per cow by the animals of the 100 per cent, 85 per cent, 70 per cent, and 55 per cent groups were 51, 44, 36, and 28 sq. yds. respectively. However, the amount of pasture on the different paddocks that were grazed over this period varied considerably, the herbage ranging in height from about 6 to 14 in. Naturally the size of the breaks allowed each day varied according to the nature of the sward, and at the two extremes the daily breaks ranged in size from 42 to 101 sq. yds. for the 100 per cent group and from 23 to 55 sq. yds. for the 55 per cent animals. In considering these areas it is perhaps useful to remember that a 1,000 sq. ft. building, such as the average small State house, covers about 110 sq. yds.

Grazing pattern and time spent at pasture: Over the same 5 weeks between 4 June and 9 July the average amounts of time spent at pasture each day by the cows of the 100 per cent, 85 per cent, 70 per cent, and 55 per cent groups were 22.0, 5.8, 4.3, and 2.8 hours respectively.

Relating these times to the size of the breaks it will be seen that each cow in the 100 per cent group had available on average 26 minutes in which to graze a square yard, whereas each animal in the 85 per cent, 70 per cent, and 55 per cent groups respectively had only 8.0, 7.2, and 6.0 minutes in which to eat off the same area.

Each day observations were made at hourly intervals between 8.30 a.m. and 4.30 p.m. of the number of cows in each group that were grazing, loafing, or lying down.

Fig. 3 shows the percentage of cows in each group that were actively grazing at each time that observations were made. A high proportion of the animals in all four treatments grazed after being introduced to their fresh break in the morning. In the 55 per cent and 70 per cent groups almost all the cows continued grazing for the limited time they spent on the pasture, while of those on the 85 per cent treatment a number were loafing or lying down toward the end of the grazing period. In the 100 per cent group not more than 80 per cent of the cows were grazing at any time in the morning, and only comparatively few after 11.30 a.m., though there was a period of very intensive grazing at 4.30 p.m. when they returned to the pasture after the hour spent in the shed for dosing and sampling.

Grazing days obtained per acre of autumn-spelled pasture: Analysis of the grazing records over the 5 weeks from 4 June to 9 July showed that the 10 paddocks which were grazed during this time, and which had been spelled for intervals of from 7½ to 12½ weeks since being grazed off previously, provided on average 94, 111, 135, and 171 cow grazing days per acre when utilised by the 100 per cent, 85 per cent, 70 per cent, and 55 per cent grazing systems. Stated in another way an acre of the spelled pasture yielded sufficient feed to last 13, 17, 19, or 25 cows for a week according to the grazing method adopted.

TABLE 2—EFFECTS OF TREATMENTS ON PRODUCTION DURING FIRST 8 WEEKS OF LACTATION

	Average	Treatment effects 100 per cent	85 per cent	70 per cent	55 per cent
Milk (lb.)	1,631	+23	—13	+60	—71
Fat (lb.)	80.4	+2.9	—0.6	+1.1	—3.5
Fat-corrected milk (lb.) ..	1,858	+53	—14	+41	—81
Test (per cent)	5.025	+0.75	+.035	—.094	—.017

A quite useful concept is that of the number of cow grazing days that an acre of pasture provides for each day that it has been shut up. For the 10 paddocks grazed off between 4 June and 9 July the number of cow grazing days per acre per day spelled averaged 1.4 for the 100 per cent grazing system, 1.6 for the 85 per cent, 2.0 for the 70 per cent, and 2.5 for the 55 per cent.

Feed produced by autumn-spelled pastures: For the same 10 paddocks it was possible to make an approximate calculation of the amount of feed nutrients produced per acre per day during autumn. It was assumed that the whole of the feed that was eaten when the paddocks were fed off was grown during the interval since the previous grazing. For the 10 paddocks the average value was found to be about 20 lb. of D.O.M. per acre per day of rest period, with a range of from 12 to 26 lb. for the different paddocks.

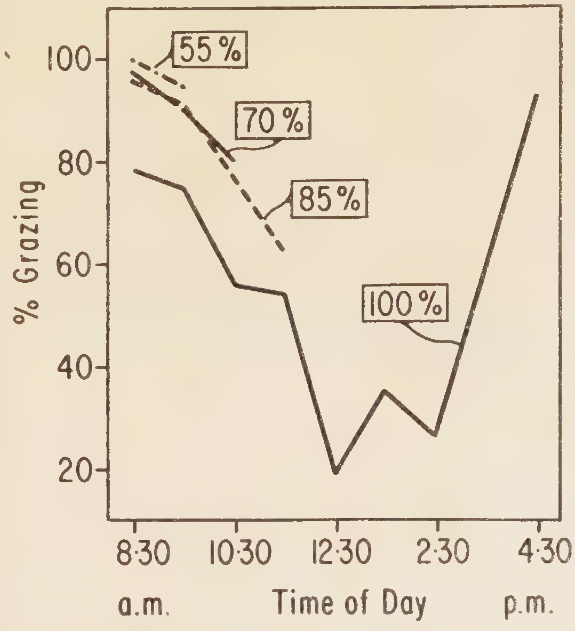


Fig. 3—This shows the percentage of cows in each group that were actively grazing at times when observations were made.

When the amounts of feed eaten by the different animals were considered in relation to their liveweights and rates of gain over the pre-calving period it was found that an average cow weighing about 850 lb. requires approximately 9 lb. of D.O.M. per day for maintenance and about 2¾ lb. of D.O.M. for each pound of liveweight increase. Thus an average 850 lb. cow gaining 1 to 2 lb. per day needs altogether about 12 to 15 lb. of D.O.M. per day, whereas the paddocks at Ruakura grew on average 20 lb. of D.O.M. per acre per day during the time they were spelled.

Effect on Production

The effects of the treatments on the production of milk, butterfat, fat-corrected milk, and average test during the first 8 weeks of lactation are given in Table 2.

The groups which were better fed before calving tended to out-produce the less well fed groups, though the differences were not large and the trends somewhat irregular.

The biggest differences are those between the extreme 100 per cent and 55 per cent treatments which amounted to 94 lb. of milk and 6.4 lb. of butterfat per cow over the first 8 weeks of lactation. At the end of the eighth week, when the experiment was stopped, these two groups were still producing at different levels and results obtained in other studies suggest that had records been obtained for the whole lactation the overall differences might have been perhaps three times as large.

Quite a number of trials previously carried out in New Zealand have shown that extremely low planes of nutrition before calving are most undesirable, leading to yields as much as 60 lb. of butterfat below those of well fed cows. The important question, however, is how far the level of feeding can be reduced without seriously lowering production. The results obtained in this trial suggest that provided cows are in good condition at the time of drying off and that they can be really well fed from the time of calving onward, there is very little to be gained from feeding them more than moderately well during the 6 to 8 weeks before calving.

General Considerations

I think it will be agreed that the information already given illustrates quite clearly what a very useful bulk of highly nutritious herbage can be carried forward into the period of less growth in winter by the autumn-saving procedure. It is recognised, of course, that the extent of the advantages accruing from the practice will vary from farm to farm, depending largely on the nature and fertility of the soil, the type of pastures, and the climatic conditions, which naturally will vary from season to season.

Pasture, particularly that grown during the autumn flush and winter, is extremely nutritious, being very digestible, rich in protein, and capable of supporting a high level of milk production. I believe it is poor practice to waste large quantities of this valuable feedstuff by feeding it to cows which are nearing the end of lactation and producing at a relatively low level. Rather, the policy should be to spell as large a proportion of the farm as possible during the latter part of April and May (certainly at least half the farm and preferably more) so that these paddocks can develop a cover before the onset of the colder months.

Pastures bared as winter approaches cannot be expected to produce much feed when frosty weather sets in. On the other hand those with a good cover will continue to grow on into winter, and the total amount of feed grown will be very much greater. Obviously the aim should be to feed as much as possible of this high-quality autumn- and winter-grown pasture to freshly calved cows, which are yielding at a high level at the beginning of lactation.

To take full advantage of the great bulk of feed grown on farms where a large proportion of the area is spelled during autumn it may be necessary to carry more cows and advance calving dates. Early calving pays provided adequate feed is available both during the dry period and after calving.

To be able to spell a substantial proportion of the farm during autumn, when the herd is still milking, it is necessary to start feeding out early. I believe that it pays handsomely to confine the milking herd to a comparatively small area during late April and May, perhaps only a third or even a quarter of the farm, and liberally supplement with silage. You may wonder how much production is lost by restricting the grazing area in this way at a stage when production is already tending to drop.

A small experiment was run at Ruakura last autumn to obtain information on this point. Twenty sets of identical twins were split on 16 April and each herd of 20 provided with an area of 20 acres. During the next 7 weeks, until 5 June, one lot of 20 members was rotationally grazed over an area of 15.5 acres; they received no supplementary feed. Their mates were break grazed over an area of only 5.2 acres but supplemented with silage at 56 lb. per head per day. (This daily silage ration contained from 9 to 10 lb. of dry matter.)

The production of the two herds was almost the same. The average differences per cow amounted to less than a gallon of milk and less than a pound of butterfat over the 7 weeks. Such differences as existed were in favour of the animals fed silage.

By drying off time, the supplemented group confined to the restricted area had been fed quite a large bulk of silage, but this relatively poor feed had been exchanged for a much greater bulk of highly nutritious fodder in the form of autumn-saved pasture; and no production had been lost.

On heavy land subject to poaching the utilisation of autumn-saved pasture can pose a difficult problem. The solution to each farmer's problem can be worked out on only his own particular property. However, information presented earlier in this paper shows that cows are capable of eating quite large quantities of autumn-saved pasture in a very short time.

It may be well worth while to sacrifice a limited acreage as a holding area, grazing the autumn-saved pasture on the on-and-off system, rather than incur quite severe damage over most of the farm. On wet farms the on-and-off system calls for good races, but it has the advantage that it enables overgrazing and excessive trampling to be avoided. The level of feeding can be controlled and the pasture left with a reasonable cover after grazing so that the subsequent rate of recovery is rapid.

At the dairy over which I have control at Ruakura, for the last 5 years virtually no silage has been fed out after mid June. After that the herd has been fed each year almost entirely on pasture. We have found it much less laborious, and a good deal more pleasant, to shift an electric fence than to lug great loads of silage about during the wet winter months and over the busy calving period. I do not suggest that on other farms in other districts it will always be easy to exploit the autumn-saving procedure to the extent that we have done. I do suggest, however, that it is well worth while for all farmers to examine their present management programme carefully to ensure that fullest possible advantage is being taken of the practice.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during October 1958 and for the 3 months ended 31 October 1958 with comparative figures for the same month and the 3 months of 1957 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
October 1958	25,877	377	26,254	—
October 1957	25,566	404	25,970	—
Increase or decrease	+311	—27	+284	+1.093
3 months ended 31/10/58	57,199	751	57,950	—
3 months ended 31/10/57	54,749	783	55,532	—
Increase or decrease	+2,450	—32	+2,418	+4.354

Butter in store at 31 October 1958 was 18,191 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
October 1958	8,649	2,118	10,767	—
October 1957	10,446	1,904	12,350	—
Increase or decrease	—1,797	+214	—1,583	—12.818
3 months ended 31/10/58	15,486	3,483	18,969	—
3 months ended 31/10/57	18,223	3,039	21,262	—
Increase or decrease	—2,737	+444	—2,293	—10.784

Cheese in store at 31 October 1958 was 6,803 tons

If these figures are converted into butterfat equivalent, there is an increase of 2.127 per cent in butterfat graded for the 3 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

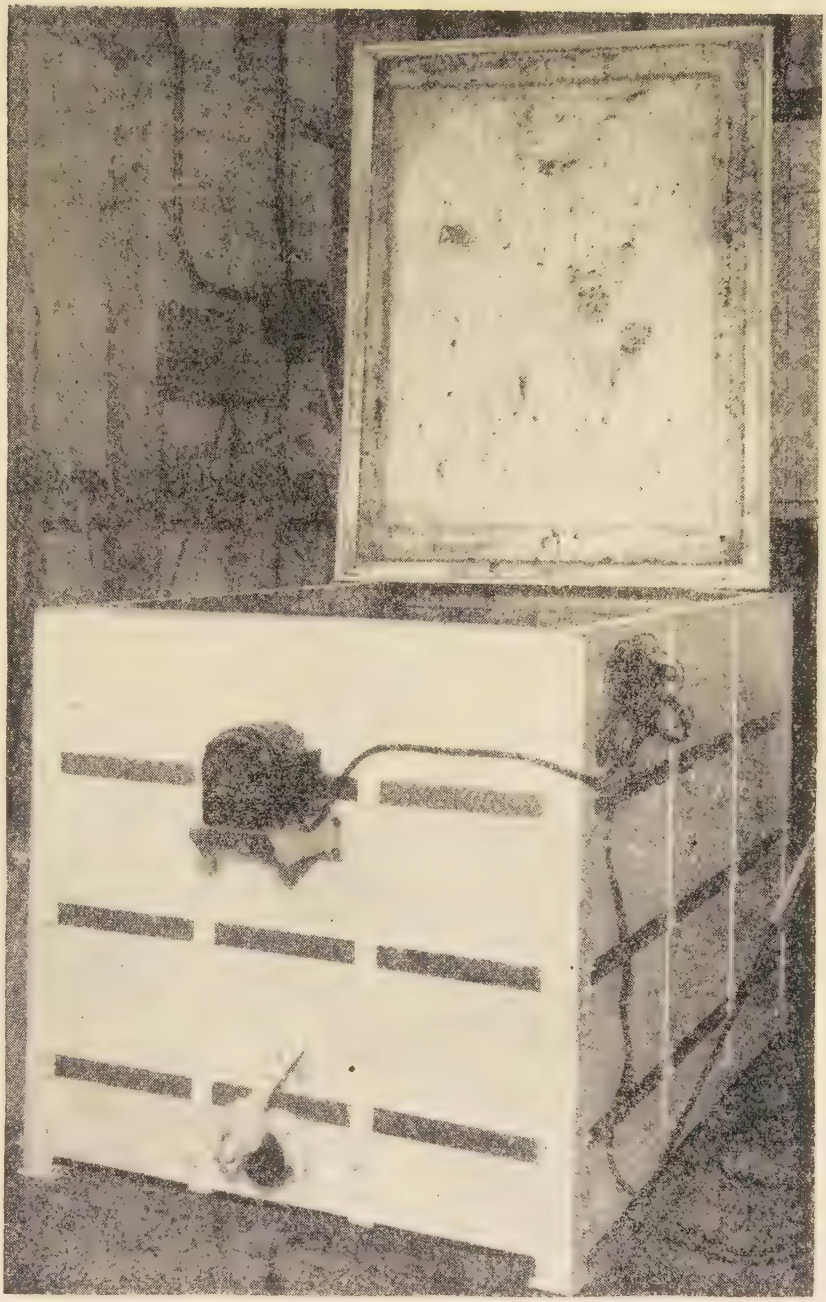
Combined Cappings, Comb, and Honey Melter

By D. ROBERTS,
Apiary Instructor,
Department of Agriculture,
Auckland

VARIOUS methods of separating honey from the wax in cappings are in general use today, depending on heat, pressure, or centrifugal force. Though all of these will deal very efficiently with certain honeys, few are capable of dealing with all types without loss. This article describes a melter designed and constructed by Mr I. E. Pullin of Auckland which will efficiently separate the cappings of both light- and heavy-bodied honeys with the minimum of loss and can in addition be used for reliquefying granulated honey or melting down old combs.

THOUGH various designs of cappings melters using electricity, steam or hot water to provide heat have been available for many years, none has proved entirely suitable for handling the cappings from heavy-bodied or thixotropic honeys. Consequently, most large producers of these honeys have had to use some form of press to reclaim honey from their cappings. Though by the use of a press the honey from the cappings is not damaged through overheating, this recovery method does not provide a thorough separation and much honey is lost when the cakes of wax from the press are melted down. Because of the boiling and dilution with water the honey from these wax cakes is unsuitable for both human consumption and bee feed.

In addition to the loss of honey the pressing of cappings involves a great deal of extra work. Mr Pullin, whose crop for some years until recently has included a considerable proportion of heavy-bodied honey, has experimented for a long time with the object of developing a melter which would handle the cappings from all types of honey satisfactorily. The present design has proved very successful with all types of honey from pure clover to manuka.



Outside of melter, showing placement of thermostat, pilot light, fan motor, and honey gate and construction of lid lining.

Details of Melter

The melter built by Mr Pullin is large enough to hold the cappings from 1½ tons of honey. Heat is provided by a 3,000-watt mineral-insulated heating cable and temperature is controlled by an immersion-type thermostat.

An 8 in. fan driven through an extension shaft by a fractional-horse-power electric motor provides the necessary interior air movement to ensure even heat distribution when the melter is in use.

Construction

The melter is built within a strongly made wooden casing the outside dimensions of which are: length 44 in., width 34 in., and height 31 in. The timber used must be thoroughly seasoned and not less than ⅞ in. thick (1 in. dressed). Native timbers such as kauri, rimu, or kahikatea are preferable to exotic timbers.

To prevent distortion of the timber from heat and to ensure a rigid construction which will support weight

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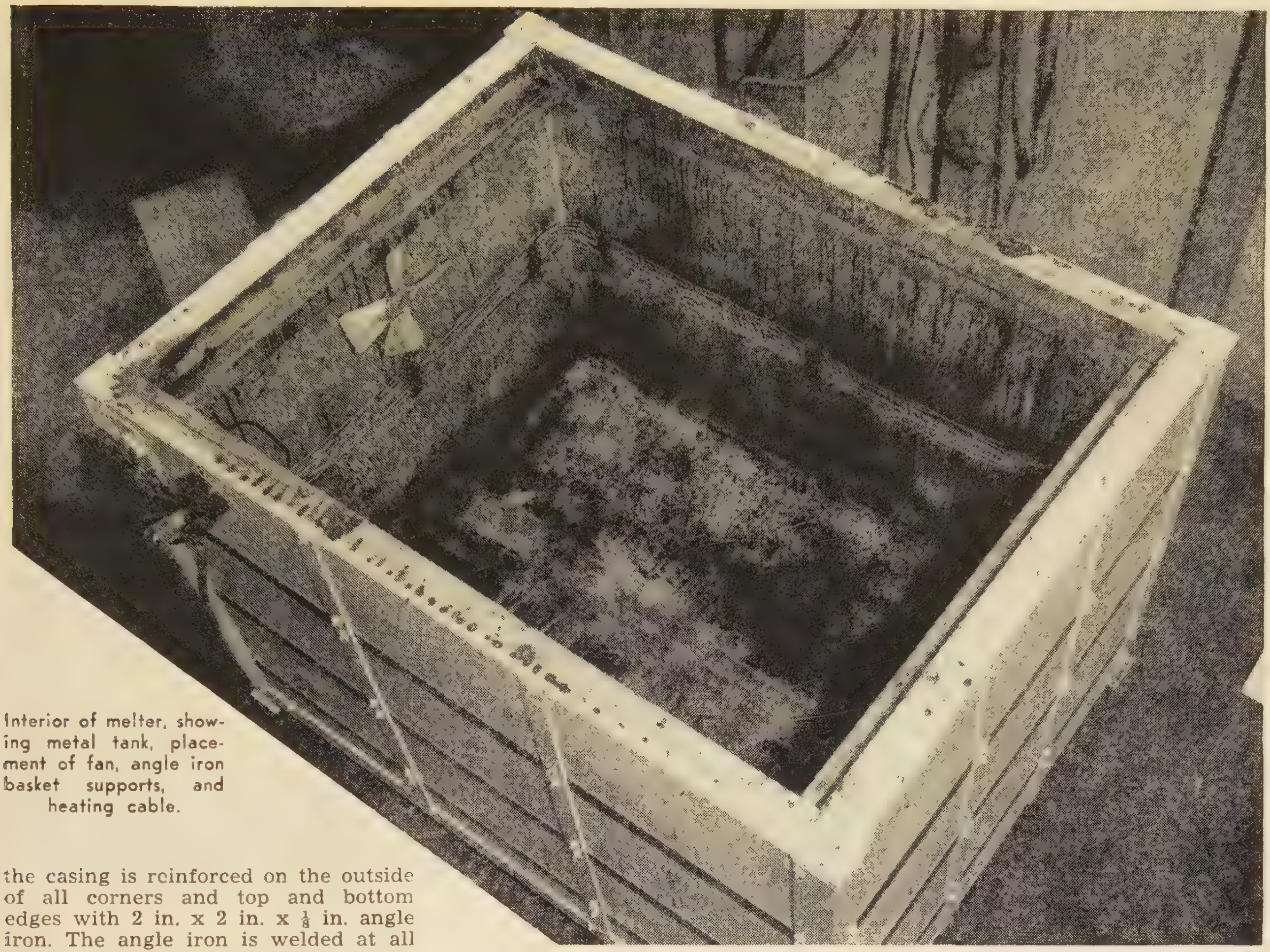


Interior of melter, showing metal tank, placement of fan, angle iron basket supports, and heating cable.

the casing is reinforced on the outside of all corners and top and bottom edges with 2 in. x 2 in. x $\frac{1}{8}$ in. angle iron. The angle iron is welded at all joints to form a really rigid framework. All joins in the timber of the casing are covered on the outside with aluminium or scrap metal strip.

When the casing has been built it is provided with heat-insulating lining and fitted with a steel tank. A suitable insulating lining is spun glass slag, which is obtainable in 3 ft. x 1 ft. bats of varying thicknesses or loose in bags. The insulating lining should be at least 1 in. thick. To provide clearance for the insulation the outside dimensions of the tank should be not more than: length 40 in., width 30 in., and depth 29 in.

The tank is made with a v bottom with the depth of 29 in. measured at the deepest point. Provision should be made at the bottom of the v for the fitting of a 2 in. honey gate. The tank is firmly supported in the casing by self-tapping screws. The spun glass slag must be packed tightly, if insulation is to be good.

The melter is covered with a lid of timber similar to that of the casing. The lid is lined on the inner side with sheet metal covering 1 in. of spun glass slag insulation.

The cappings basket is made of No. 4 20-gauge galvanised wire mesh. It is 35 in. long, 26 in. wide, and 19 in. deep. These dimensions allow good clearance between the basket and the sides and ends of the tank and provide ample space for the accumulation of honey and beeswax at the bottom of the tank when the melter is operating.

The basket is made with a top frame of 1 in. x $\frac{1}{4}$ in. steel strip and side and end frames of $\frac{3}{4}$ in. x $\frac{1}{8}$ in. strip. The frames are riveted together to form a rigid construction. The top frame is extended $2\frac{1}{4}$ in. at each end to form supports which rest on two pieces of $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x $\frac{1}{8}$ in. angle iron bolted one to each inner end of the tank and casing. As the basket will have to support considerable weight when in use, it must be accurately and strongly made.

Heating

The electric heating cable is coiled round the inside of the tank in one close section about 3 in. wide half-way between the top and bottom of the tank and is held by metal clips. The efficiency of this melter depends greatly on the positioning of the heating cable as mentioned and best results will not be obtained if it is placed elsewhere. The length of the heating cable is 180 ft., which gives 3,000 watts at 230 volts.

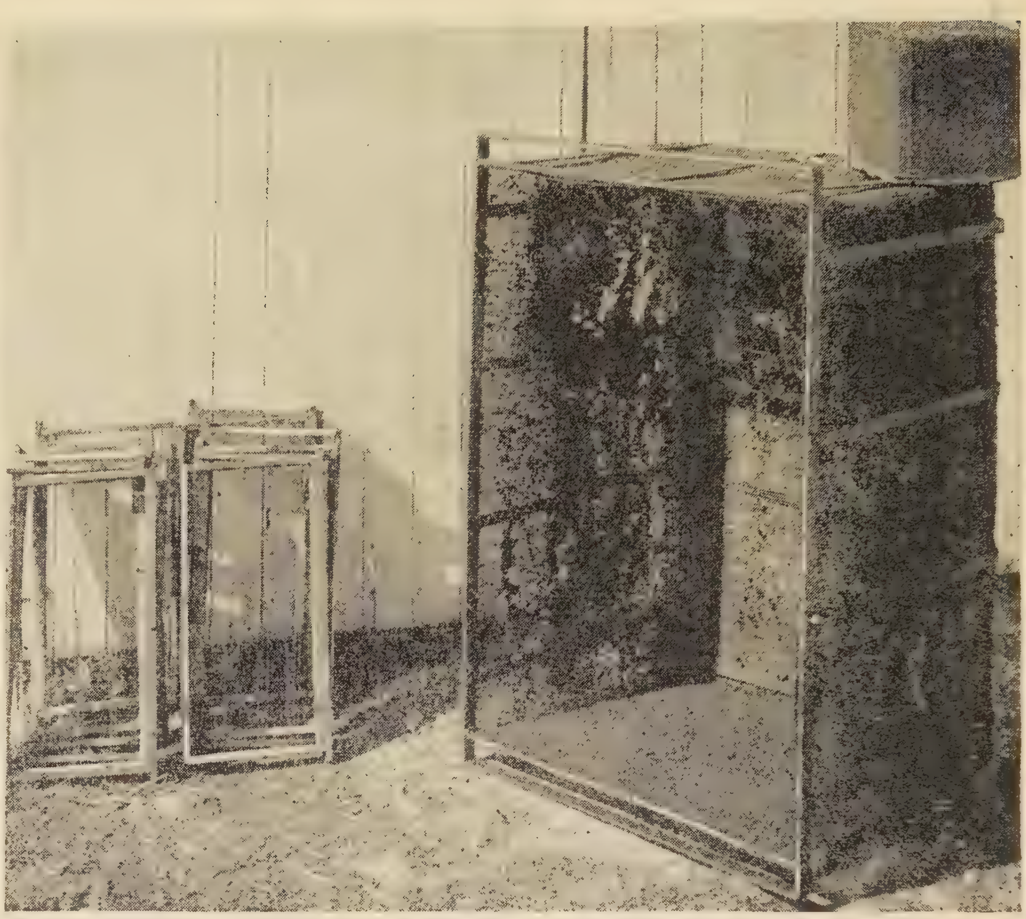
The heat is controlled by a thermostat which is fixed near the top right (or left) corner at the front of the melter so that the stem is immediately under one of the $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. angle irons which support the basket, as in this position the stem is not likely to become heavily coated with honey and wax, which could affect its efficiency.

The fan is fitted on the inside of the front of the melter half-way between the heating cable and the top.

Because the unit is noiseless, it is advisable to have a pilot light connected in the circuit to indicate when the current is on. The heating element and fan motor are wired so that both are controlled by the thermostat.

Method of Use

Uncapping is done directly into the melter basket, the melter being of a convenient height to make a satisfactory uncapping bench. When uncapping is finished or the melter is full the lid is put on, the thermostat set at 120 degrees F., and the power switched on. Twelve to 14 hours' heating will make most of the honey separate from the wax. This honey is then run off through the honey gate, the thermostat reset to 180 degrees F., and the melter left in operation for a further 4 to 6 hours, when all the wax will be melted.



This shows the → construction of the cappings basket. It was photographed immediately after the melting down of some hundreds of culled brood combs. The frames (left) are free from residue and the wax block (on basket) is clean.

Though the 12 to 14 hours' heating at 120 degrees will separate almost all the honey from the wax, there will still be a small residue of honey in the cappings. When the temperature is raised to 180 degrees this honey will become overheated and spoilt for human consumption, but it can be used safely for bee feed. The amount of saleable honey lost from a 30-ton crop is not normally more than 8 to 10 60-lb. tins, considerably less than where a press is used.

When all the cappings are melted and before the wax is run into moulds the honey gate is opened a little and the overheated honey run off, the gate being closed as soon as wax appears. Before the wax is run into the moulds about 2 in. of hot water should be put in each. The wax blocks when cool can then be cleaned easily and are ready for disposal without further treatment.

Power consumption of the melter is very light, costing about 1s. 6d. for each complete melting.

Other Uses

The melter is also a very efficient unit for reliquefying granulated honey and for melting down old combs.

When granulated honey is to be reliquefied the basket is lifted out and the tins of honey stacked in the tank. If granulated honey is only to be softened, as with honey to be used for starter, the thermostat is set at 80 degrees F. If the honey needs to be completely liquefied, the thermostat is set at 120 degrees. In both cases the time needed is as for the separation of the honey from the cappings (12 to 14 hours).

MATERIALS NEEDED FOR MELTER

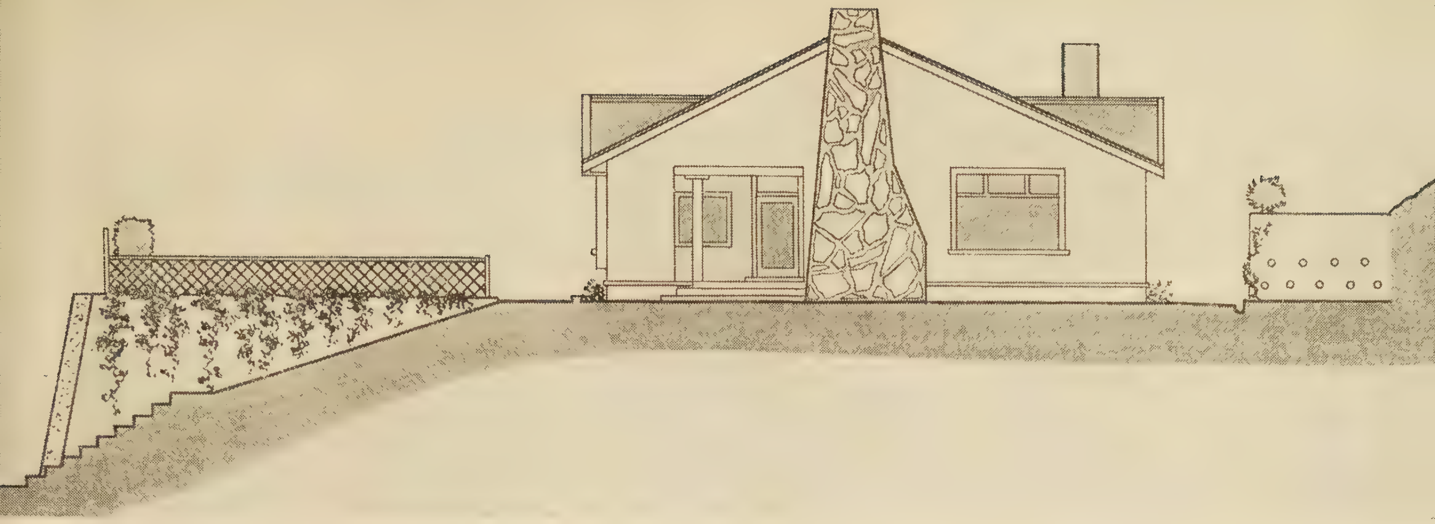
Timber ⅞ in. (1 in. dressed)	55 super. ft.
Spun glass slag	Loose or in bats
Steel sheet for tank and lid lining	Two 8 ft. x 4 ft. sheets
No. 4 20-gauge galvanised wire mesh	23 sq. ft.
Mineral-insulated electric heating cable	180 ft.
Termination for heating cable	
Tank-type immersion thermostat	
Fractional horsepower electric motor with extension shaft	
8 in. fan	
Angle iron:	
2 in. x 2 in. x ⅛ in.	44 ft.
1½ in. x 1½ in. x ⅛ in.	6 ft. 6 in.
Steel strip:	
For basket top (1 in. x ¼ in.)	16 ft.
For basket support (¾ in x ⅛ in.)	40 ft.
Aluminium or scrap metal strip for covering joints in wood of casing	

When old combs are to be melted down they are stacked in the tank which, when of the dimensions given, will hold a considerable number, and the thermostat is set to 180 degrees. After 4 to 6 hours at this temperature the combs are completely melted and the frames are ready for tightening of the wires and fitting with new foundation. The separation of the wax from the slum is almost complete, less than 1 per cent being retained.

Carefully made and properly wired, this unit is very versatile and should fill a long-felt need of many beekeepers. The absence of glowing elements and the very thorough insulation provide the maximum possible degree of safety from fire.

Beekeepers wishing to build this melter and requiring any further details or plans should get in touch with the author.

Photographs by Sparrow.



▲ Garden of a house on a steep section. At the left of the house retaining walls have made possible a lawn bounded by a wooden trellis and a wire trellis and ornamental shrub hedge. A raised kerb to the path keeps run-off from the house and the path slopes to steps. On the right of the house the path slopes gently to a channel drain. Low shrubs have been planted on top of the wall and trailing and clinging plants encouraged on the wall, into which weep holes have been built.

Hillside Gardens

THOUGH a more interesting garden may eventually be made on a sloping site than on a flat one, the initial effort is often greater and maintenance and future development also take more time and energy than in a level garden. There are advantages, though, in a sloping and elevated site; it is normally reasonably well drained, and is often above frosts and fogs that develop in adjacent flat land or valleys. These are matters which should be considered where there is a choice between a house and garden on flat land and on a hilly area.

By J. P. SALINGER,
Horticulturist,
Department of Agriculture,
Wellington

THE work involved in turning bare hillside into a garden should be carried out in successive stages; these are access or approach, provision of shelter, preparation of areas for the various parts of the garden, and the choice and setting out of suitable plants. Naturally, most gardeners want to brighten the property from the first and this can be done by planting easily grown bedding plants, and bare areas can be stabilised by putting in trailing plants such arctotis, gazanias, and mesembryanthemums, but the permanent planting of trees and shrubs should be delayed until areas have been developed for them.

Planning the Garden

Even before the house is finished, it is advisable to draw a rough plan of the main areas of the garden. These would be:

1. A semi-public area of approach.
2. A private ornamental area, often including an outdoor living area.
3. A service area for household use.
4. A utility area for fruit and vegetables, compost, etc.

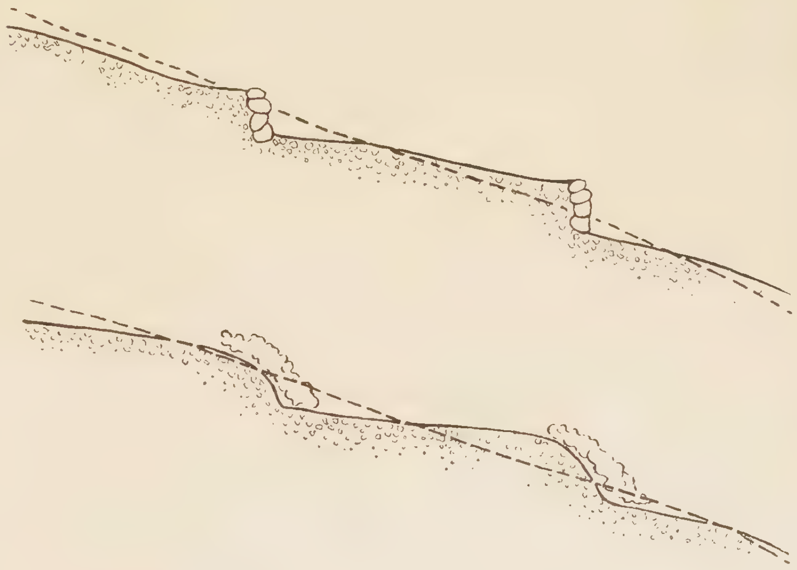
These areas should then be staked out on the section, though it may be necessary to excavate or fill an area before it can finally be used.

Access to House and Garden

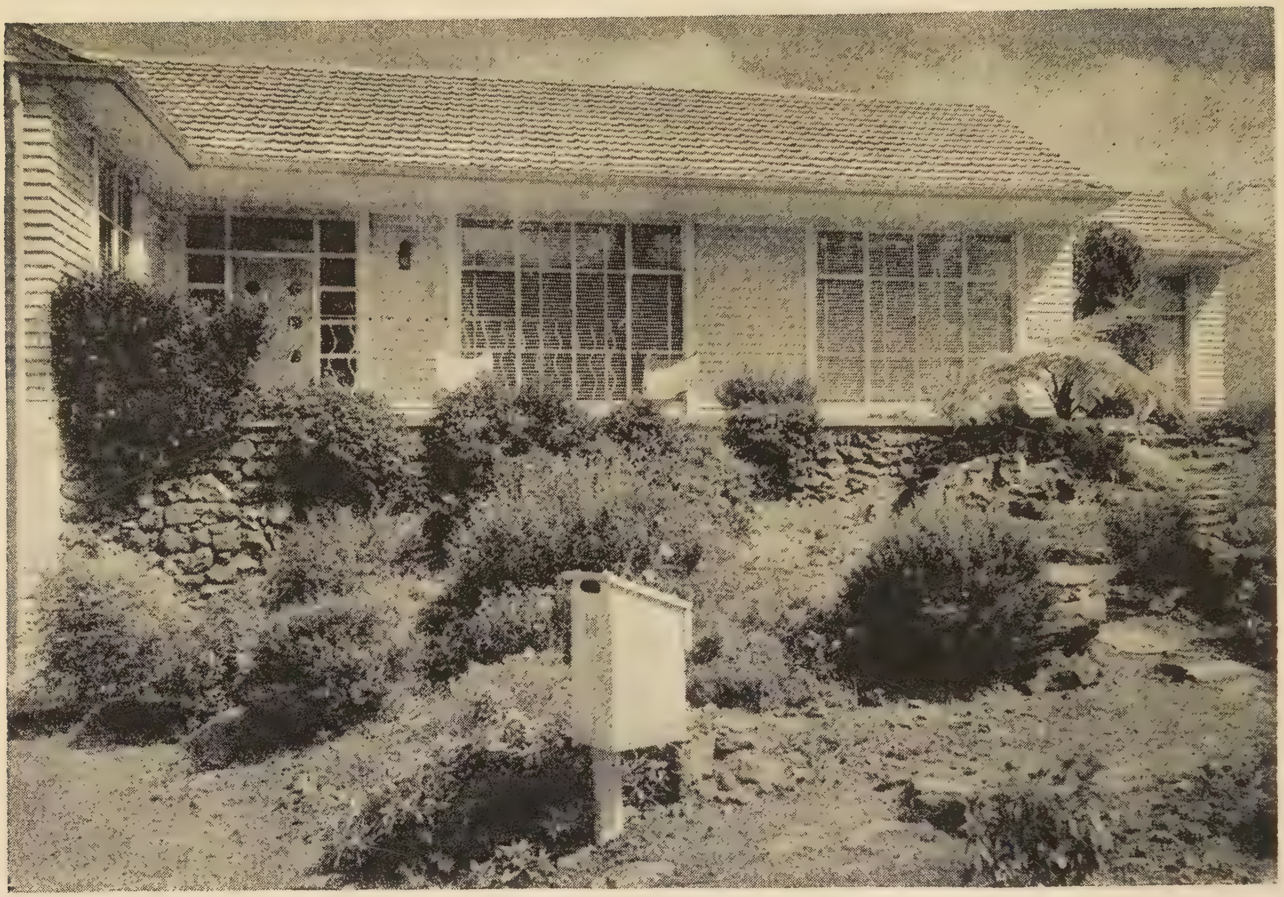
Builders seldom make permanent paths to the building site. If access is difficult, they usually choose the most direct route from the road to the site and use chutes or trolleys for moving building materials.

The formation of a suitable path from the road to the house is one of the most important aspects of garden development on a sloping section. Nearly always a gently sloping path is better than a direct path with steps.

A sloping path, even if it zig-zags across the property, is easier for



Upper—Several low retaining walls are better than a single high one on sloping sections, as they are easier to build and lend themselves to suitable planting. Lower—Another way of dealing with slopes. Banks covered with prostrate shrubs are used in place of retaining walls.



[*Sparrow*

The underlying rock occurred naturally on this slope; an attractive informal garden has been made by using the rock and planting suitable low-growing rounded shrubs.

elderly people or children. It is safer at all times, especially at night or when loads have to be carried. Steps must be carefully made of solid, non-slippery materials.

If a section is narrow or access is obtained only through a steep narrow strip of land, it may be necessary to build steps, preferably with a rise of 5 or 6 in. and a tread of 14 in. Where possible, small landings should be made after every 12 steps so that people can rest.

Except on a very easy slope it is most desirable to provide a handrail of solid, firm material such as 3 x 2 in. timber or 1½ in. galvanised piping. The handrail could be painted white. The uprights should either be fixed to short concrete posts set in the ground or made of treated rot-resistant timber.

Steps should be made of concrete, concrete blocks, or bricks cemented together; they should not be made from timber set on edge, filled with loose metal or soil, as these seldom remain firm and even.

Paths must be firm, as water will run down them, and they should not be steeper than 1 in 6. Probably the most durable material is concrete made of 5 parts of builders' mix to 1 part of cement; on a firm base a mixture of 6 to 1 would be sufficient. The surface should be finished with a wooden float, not a metal float or trowel, as they give too smooth a surface. Alternatively the concrete can be surfaced with cold bitumen and sand.

Satisfactory paths can be made of shells, clean crushed metal, scoria, or rock, but the base must be firm and at least 2 in. of material applied; otherwise it will work into the base. It is necessary with such a path to have a firm edging of treated timber, bricks, or concrete.

Gradually, as the section develops, other paths can be made of permanent materials. To begin with tracks are often made across the garden; on many soils these can be slippery in wet weather. A good temporary surface can be obtained by covering these tracks with sawdust.

Shelter

A hillside house and garden usually has a good view, but mostly this means that the site will be open to the wind. Shelter is important to protect the plants and people in the garden and to give privacy.

It is usually too expensive to provide a permanent timber fence right round the garden, and a boundary fence is unlikely to shelter all parts of a sloping garden.

Where a house is to be built in existing bush or even rough scrub it is a great advantage if this can be retained at first and not cut or burnt; some areas and gaps should be cleared, but if the remainder is left, it will provide shelter for permanent plants later. As these grow up, the other plants can be cut or dug out.

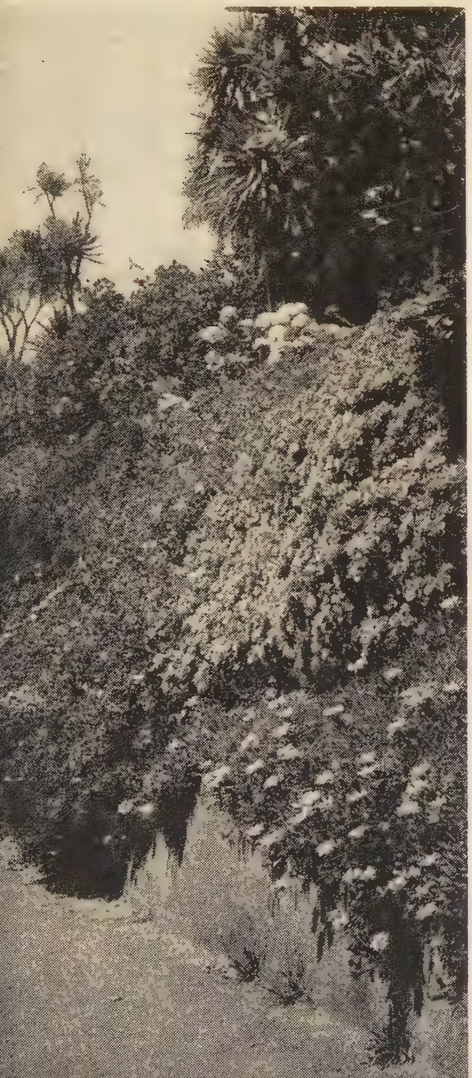
On a bare area the quickest temporary shelter can be obtained by sowing or planting tree lucerne. This will protect the permanent plants that are grown for a boundary hedge or elsewhere. Eventually, the tree lucerne should be cut out, as it is subject to borer and silver leaf disease.

Temporary shelter can also be made from brushwood intertwined in the boundary fence wire. Hedges should be planted in a double row of plants. This will make a thicker hedge more quickly, as the plants protect each other.

Some shelter may also be needed across the garden to protect individual areas. This can be provided by trellises or hedges of less strongly growing shrubs grown in either a trimmed or informal, untrimmed manner. Good protection can also be obtained from vigorous growing climbing plants trained on wires; strong growing varieties of climbing roses, campsis, *Clematis montana rubens*, or passion flower vine (*Passiflora* spp.) are suitable.

Slopes and Terraces

It is necessary to decide from the beginning whether the garden will be developed from slopes or terraces or a combination of both. A good rule is to have both slopes and terraces, the steeper areas being cut into terraces. A slope is suitable where the ground is not steeper than 1 in 6, as it is possible to mow a lawn safely and cultivate plants on this slope; even so, it may be easier to reduce the slope slightly and make a slightly steeper drop between each section without a great deal of soil moving (see the diagram on page 191).



← A steep clay bank covered with gazanias and succulents. The base of the bank is held by a low concrete wall.

The steepness of the slope of this hillside garden is broken by the planting of trees and shrubs and hedges following the path.

It is most desirable to have a flat area immediately round the house to provide a small lawn or play area. This should include a drying area. It is usually easier to grow vegetables on a flat area; otherwise the rows of plants may have to be set out across the slope and not necessarily in the best direction for cultivation.

If terraces are made on the steeper parts, a good deal of earth moving will need to be carried out. Steeper slopes can, however, be made most attractive by planting them with prostrate or low spreading shrubs or perennials. Taller trees and shrubs can then be introduced as accent plants among the lower growing ones.

Terraces

Steeply sloping gardens should preferably be terraced to provide a larger growing area. Terraces retain the soil better and are safer and easier to cultivate. It is seldom possible to employ heavy machinery to make terraces, so a long-term plan should be thought out to decide which areas are to be terraced first. In general it is better to have a series of small low terraces rather than large flat areas with the consequent high bank at the back and front.

Though individual requirements vary, the order of development could be:

1. Immediately round the house;
2. The semi-public area;
3. Vegetable garden or section suitable also for special plants;
4. Other parts of the garden.

The part adjacent to the house should be completed first, as it is used constantly immediately or even before the house is occupied.

The usual method of making terraces is to strip off the topsoil and pile it on one side. The slope at the back is gradually cut back and the soil brought forward. It is not necessary to estimate accurately the area which will be filled, unless the far side of the terrace has a fixed limit. In this case, the inner and outer limits of the terrace can be marked out by measuring from the front to the back of the slope and placing a stake at the middle point of the line. The front edge should be built up as a retaining wall and all the soil behind the middle point should then be brought forward.

Once the subsoil has been moved and well broken up, if consolidated during construction, topsoil should be brought back and spread over the whole area.

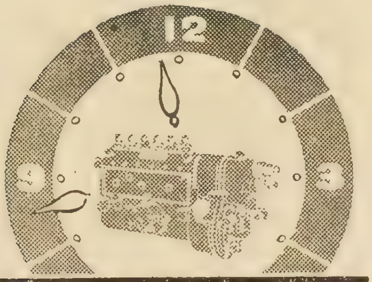
Terraces Adjacent to the House

Special care should be taken in forming the flat areas adjacent to the house. It is easiest if the main work is carried out when the house is being built, as the gardener can then complete the levelling and the making of paths and flower beds.

Where a house is built on a slope there is usually a vertical bank and rising ground above the house. A permanent drain of half-round tiles or tiles covered with coarse metal should be formed at the base of this bank. It should lead to a stormwater drain or lower down the slope. If this is not done, water may flow down the bank and seep under the house, making it damp.

Paths round the house should slope outward, away from the house, or the inner edge of the path should be lipped; this will keep stormwater from the base of the house.

The terrace in front of the house is frequently laid out as a flat lawn, perhaps with flower beds. Some protection must be set up on the outer edges, as this area is in frequent use. To begin with the edge can be pro-



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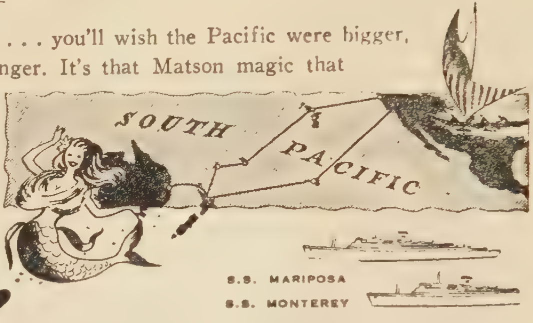

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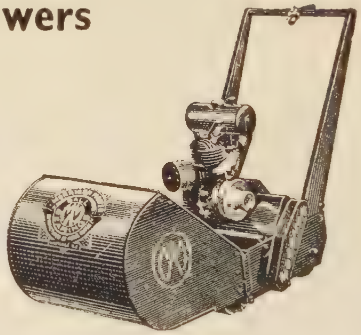

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tected with stakes and woven wire fencing, but a more permanent and attractive hedge can be grown from ornamental shrubs or slow growing hedge plants such as abelia, corokia, golden euonymus, golden privet, or tecoma.

Less steep parts on each side of the terrace can either be protected at the top with low wooden trellis or can be planted with dense shrubs such as camellias, ceanothus, hydrangeas, and breath of heaven.

Covering Slopes

Slopes are very suitable for lawns and can also be used for groups of trees and shrubs; beds filled with annual bedding plants look out of place on a slope, but a broad border toward the back of the slope can be filled with these plants.

Trees and shrubs should be grouped on a slope and not planted haphazardly. It is especially important to choose them for general shape and colour as well as for their ability to grow well on slopes.

General rules to follow when planning groups of woody plants can be summarised as follows:

1. Most deciduous and winter flowering plants should be set close to the house, though brilliant flowering shrubs such as deciduous azaleas can be set at a distance against an evergreen background.
2. Evergreen plants with brightly coloured foliage can be planted further away from the house and preferably backed by dark evergreen plants.
3. Plants with a tall pyramidal habit should be used to lead the eye to the distance and not normally set on the skyline. However, a group of these plants can be used to frame a distant view.
4. More rounded plants should be used in the distance or on banks between different levels.
5. Taller plants should be underplanted with low shrubs.

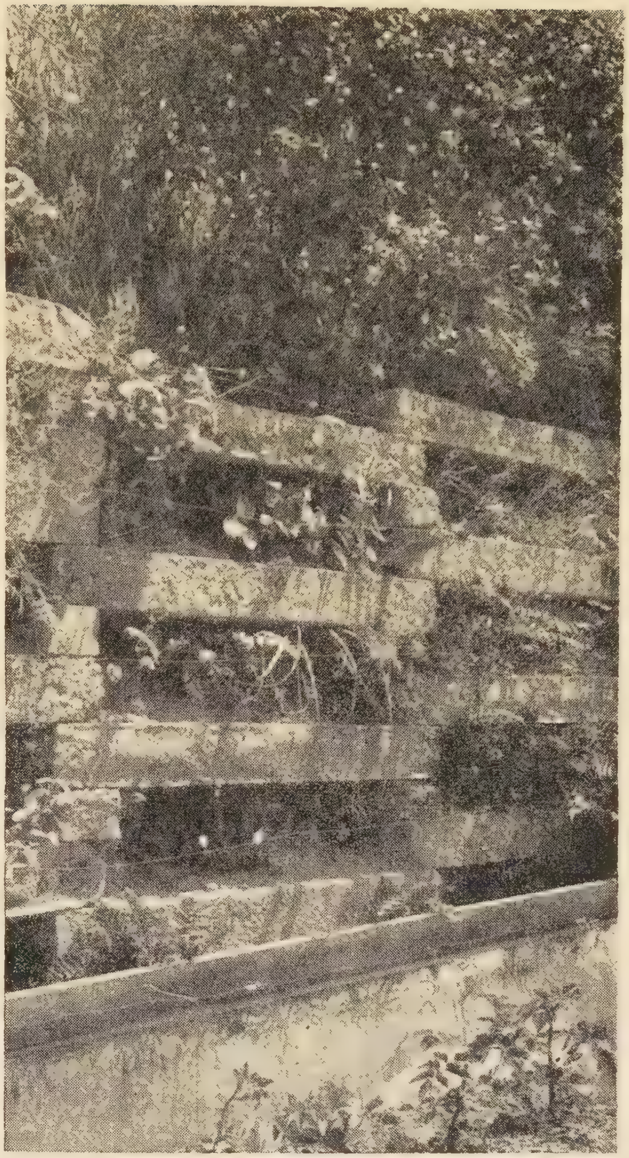
A list of suitable trees and shrubs is given on page 196.

Rocks and Slopes

Many gardeners consider the possibility of making a rock garden on a slope, especially if there is rock in the area. Admittedly, the slope will reduce the work of shifting soil or the necessity to bring in soil, but the construction of a natural and attractive rock garden will still involve a good deal of work.

The rocks have to be brought to the site and have to be firmly set in the soil. Rocks and boulders dotted here and there on a slope do not make a rock garden. The lines of rocks should blend with the contours so that the whole garden appears as a natural development. Rock gardens generally require more regular attention and maintenance than most other parts of the garden and in warmer areas many of the true alpine and rock plants do not grow well.

The rock garden should appear as an outcrop; and one of the most attractive methods is to place it in a setting of lawn. On a steep slope it is better to use the rocks as retaining walls for small beds and to have narrow paths leading between the beds. The paths can be surfaced with broken rock or metal and stepping stones placed in the beds so that plants can be easily attended to.



A terrace retaining wall (crib wall) built of solid concrete blocks. A hedge along the top of the wall protects the garden behind and ensures that this area is safe. Ferns and small shrubs have been planted in the spaces between the blocks.

Retaining Walls

Except on very stable soils it will be necessary to reinforce both the front and back of a terrace. If this is not done, the soil may fall away and it may be dangerous to walk on the terrace.

Retaining walls can be built of rocks, boulders, brick, reinforced concrete, or concrete blocks. All of these should be built with a slight batter. Where rocks, boulders, and bricks are used it is preferable to cement them together unless it is intended to form a dry wall planted with rock plants. Unless a dry wall is very well made with a steep backward slope or batter of at least 3 in. to each foot in height, the wall will not be stable; in general, these walls become filled with weeds unless they are regularly cared for. When such walls are cemented in, a batter of at least 1½ in. to each foot in height is needed, but they are safer, require less maintenance, and remain free of weeds. Weep holes should be made in the middle and near the base of the wall as it is being built.

Reinforced concrete walls are permanent but very expensive and probably the cheapest and easiest method is to build a crib wall of concrete blocks. Hollow concrete blocks can be placed on edge or special crib blocks can be purchased. It is necessary to tie these blocks into the soil. Hollow blocks and specially drilled crib blocks can be held by inserting steel reinforcing rods through the holes vertically down into the base of the terrace. Where rods are not used with solid blocks, alternate courses of blocks should be set end on, the block penetrating the soil of the terrace.

On stable soils a vertical face can be surfaced with cement plaster

Shrubs for Covering Slopes

A list of shrubs follows and those that are frost tender (f.t.), very hardy (v.h.) or suitable for seaside planting (s s.) are marked. The remainder will grow in all other parts of the country.

Abelia floribunda
Acacia
Adenandra
Agonis flexursa (f.t.)
Banksia (s.s.)
Beaufortia sparsa
Callistemon (s.s.)
Caryopteris (v.h.)
Ceanothus (evergreen species) (v.h.)
Ceratostigma (v h.)
Choisya ternata (v.h.)
Chrysanthemum frutescens (marguerite daisy) (f.t.)
Cistus (v.h., s.s.)
Coleonema pulchrum (f.t., s.s.)
Coprosma baueri variegata
Cotoneaster horizontalis (v.h.)
Cytisus varieties (v.h.)
Dodonaea (f.t.)
Dryandra (f.t., s.s.)
Euryops tenuissimus (s.s.)
Felicia angustifolia
Fuchsias
Grevillea
Hakea (f.t.)
Hebe (veronica) (v.h.)
Hydrangea
Hypericum moserianum
Isopogon (f.t.)
Juniperus sabina
Lantana (f.t)
Leonotis (f.t., s.s.)
Leptospermum
Leucadendron (f.t., s.s.)
Leucospermum (f.t., s s.)
Metrosideros tomentosa (f.t., s.s.)
Olearia (v.h., s.s.)
Phlomis (v.h)
Pittosporum (v.h., s.s.)
Podalyria (f.t., s.s.)
Polygala (v.h., s s)
Prostanthera
Protea (f.t., s.s.)
Raphiolepis (s.s.)
Senecio (v.h.)
Spartium (v.h , s.s.)
Virgilia (f.t., s.s.)

reinforced with wire netting. The face should be cut smooth, 4 in. nails partly hammered in, and 1 in. wire netting fixed to the nails. At least 2 coats of cement plaster should be applied, using a mixture of 4 parts of sifted sand to 1 part of cement. The first coat should be applied with a trowel and roughened slightly to take the next coat, which can be given a smooth finish. Low terraces may not need a wall and can be covered with trailing plants or with grass, which is cut with a sickle or shears.

Paths on Terraces

Unless a terrace is narrow and less than 3 ft. above a lower level, it may be necessary to make a path on the terrace. In general, it is better to run the path along the back of the terrace, and if the back wall faces the sun, a narrow bed can be left between this wall and the path. These beds are warm, as they receive the reflected heat from the wall, and can be used for less hardy plants or for climbers to be trained on the wall. The path may be made of stepping stones, cement blocks, or grass; where grass is used the path should be wide enough to take a lawnmower.

Plants for Banks and Slopes

On a gentle slope most trees, shrubs, and bedding plants will grow satisfactorily. Roses or azaleas can be grown in small beds across the slope, provided they are given some shelter from the wind.

Steeper slopes can be grassed, planted with one or two larger shrubs to provide a feature, and bulbs can be naturalised in the grass. The grass needs to be mown before the foliage appears and must not be mown again until the leaves are dying off. For this reason the bulbs should be grown in irregularly shaped groups on the slope. Crocus, narcissus, ixias, and bluebells (wood hyacinths) are all suitable for planting in grass. Steep slopes and terrace faces can be planted with trailing or climbing plants.

An effective way to brighten a bank is to plant rambler and climbing roses at the base and pin these with bent wire on to the bank; if this is grassed, the roses can be unpinned when the grass needs cutting. Wichuriana and hybrid musk roses are especially suitable, as the flowers grow in clusters and make a better display than climbing hybrid tea varieties. A number of trailing plants establish well on steep faces and are easily propagated from cuttings of short shoots inserted in late summer or early autumn where they are to grow. These include arctotis, *Convolvulus mauritanicus*, *Dimorphotheca ecklonis*, gazanias, ivy-leaf geranium, and trailing rosemary. In relatively frost-free areas *Ficus pumila*, *Lantana sellowiana*, and *Polygonum capitatum* can be grown, and in the colder parts aubretia and "snow in summer" (*Cerastium tomentosum*) grow well.

Many cacti and succulents are suitable, especially trailing and rosette types. Varieties and species of the following genera are all suitable for steep faces, provided they are not too shaded: aeonium, cotyledon, echeveria, euphorbia, ice plants (mesembryanthemum), house leeks (*Sempervivum*), *Rochea coccinea*, and sedum.

Very shady slopes can be made most attractive with various species of ferns which often grow naturally in these positions.

Both ivy and Virginia creeper (*Parthenocissus tricuspidata*) can be planted at the base of a vertical wall and will support themselves on the surface.

Many steep slopes are eroded and the surface soil has been washed away; the subsoil is poor but usually reasonably well drained. In most warmer parts such sites are ideal for Australian and South African shrubs, and in the cooler parts several New Zealand native plants are very suitable.

Garden Work for March

Though at this season bulb planting claims priority, maintenance of lawns, pest and disease control, or propagation should not be neglected.

By ROSALIE A. CAMPION,
Horticultural Instructor,
Department of Agriculture,
Wellington

Mildew on Euonymus

The golden-leaved varieties of *Euonymus japonicus* are now widely grown because they are attractive and hardy, but they are susceptible to the fungous disease powdery mildew. The disease, which is seen as white patches, causes puckering and distortion of the leaves and reduces the vigour of the bush. Sprays of lime sulphur, 16 fl. oz. to 4 gallons, or Karathane, 1¼ oz. to 4 gallons, will control this disease.

Mildew on Annuals

The downy mildew fungus can damage annual seedlings, especially stocks and antirrhinums. Both of these plants can be planted out now in the milder districts for spring flowering, but gardeners should be sure that the plants are healthy. Infected plants appear unthrifty with the leaves curled at the edges, and on some plants a downy mass of spores may appear. If infection is first noticed after planting out, sprays of zineb, ½ oz. to 4 gallons, or copper oxychloride, ½ oz. to 4 gallons, should be used for control; otherwise the plants will be severely debilitated.

Growing of Bedding Plants

Spring flowering plants such as sweet williams, forget-me-nots, Iceland poppies, Canterbury bells, or antirrhinums which have been grown in

Planting anemones. After the area is prepared for planting by forking and fertilising, the tuber is planted with the flat surface uppermost.

Planting narcissus bulbs. The bulbs correctly planted on prepared soil.

boxes and await transplanting should not be neglected. In most gardens they will not be planted out for another month until the autumn flowers are past their best, but in the meantime they should be kept watered. A side dressing of balanced fertilisers could be given to any plants which have been in boxes for a long time.

Wallflower plants which were lined out earlier should be making considerable side growth to form compact bushy plants. If this is not so, the tips could be nipped out.

Bulb Planting

The planting of most bulbs should be carried out this month. Before planting, healthy narcissi bulbs should be chemically treated to prevent attack by the narcissus bulb fly during the next 2 years. The clean bulbs should be soaked for 10 minutes in a mixture of aldrin 40 per cent wettable powder, using 1 oz. to 1 gallon of water, **or** aldrin emulsion, using 4 fl. oz. to 2½ gallons of water, **or** chlordane 45 per cent emulsion, using 4 fl. oz. to 2½ gallons of water.

Aldrin and chlordane are listed with DDT as poisonous and care should be taken in their use. Narcissi bulbs should be planted with 4 in. of soil above the nose of the bulb.

Tulip bulbs can be planted up to 10 in. deep, if they are to remain in the soil for several years. They make an excellent interplant at this depth in a rose bed, where they flower before the roses have made much growth. The bulbs should be dusted with thiram before they are planted.

Anemones and Ranunculus

Anemones and ranunculus are two very worthwhile plants for spring displays and should be planted now.

Anemones are more hardy than ranunculus and prefer a lighter soil, though both will grow quite well in average soil under sunny conditions. A dressing of lime should be given before planting and at planting a dressing at 4 oz. per sq. yd. of bonedust can be applied to the topsoil. Both the anemone tubers and ranunculus claws should be dusted with a fungicide such as thiram before planting 9 in. apart and 2 in. deep. Some confusion often occurs as to which way up they should be planted. Anemone tubers should be planted with the flat surface uppermost and ranunculus claws should be pointed down.

A Poisonous Bulb

Though Cape tulip is attractive, care should be taken not to plant it. It is a very serious weed because it is extremely poisonous. Since the revision of the Noxious Weeds Act in 1950 its propagation has been prohibited. If it is known to be in the garden, it should be eradicated and the bulbs should be burnt.

The bulb is round and varies in size from very small to 1½ in. in diameter. It is covered with a mesh of fibre and has been distributed among many home gardens. The plant has one leaf per bulb up to 3 ft. long. The branched flower stalk is the same height and has many flowers opening over a long period. The flowers have six petals and are salmon coloured with a lemon centre or pure lemon.

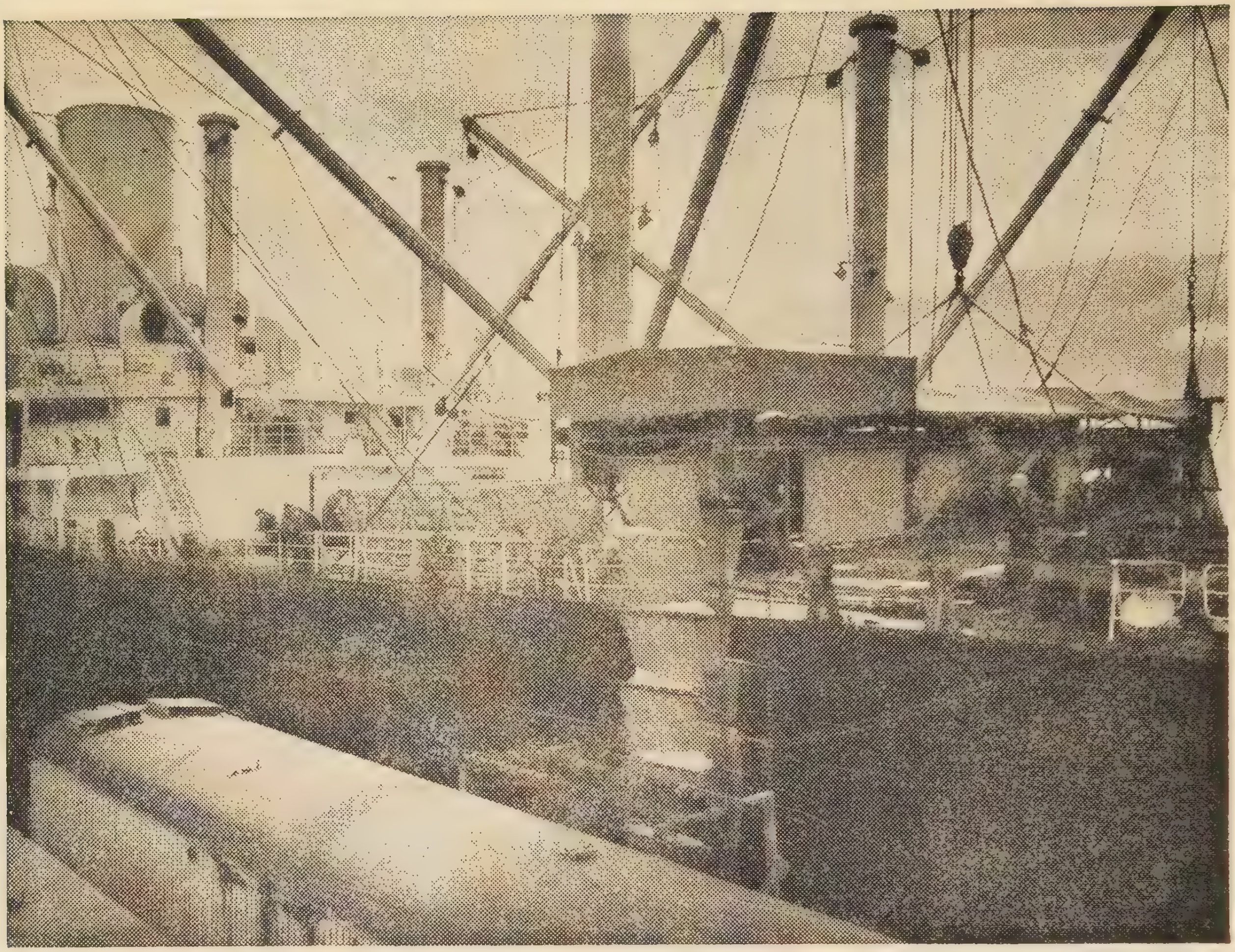
Sowing and Topdressing Lawns

Lawns can be sown this month. As lawns are a permanent feature of the garden, time and care taken to eradicate perennial weeds, provide drainage, consolidate the soil efficiently, and obtain good seed is well worth it. For most areas a mixture of 2 parts of chewings fescue and 1 part of browntop broadcast at ½ oz. per sq. yd. will give a good, fine-textured lawn. After sowing, a fertiliser mixture of 3 parts of sulphate of ammonia and 1 part of superphosphate can be broadcast at ½ oz. per sq. yd. and raked in with the seed. The seedbed should not be rolled after sowing, as the ground may cake and affect germination detrimentally. The earliest a roller can be used on a new lawn is when the new grass is 1 in. high.

Bare patches on lawns can be worked and consolidated before reseeding in the same manner as for a new lawn. The lawn edges should be trimmed regularly.

Organic Matter

Most soils in New Zealand are low in organic content and are greatly improved by the addition of organic matter in any form. The farm gardener can generally obtain supplies from under the sheep shed or from the milking shed, but the town gardener usually must rely on plant waste materials.



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Loads of sawdust can often be obtained and mixed with lawn clippings or other materials in the compost heap to rot before use. Fish waste is sometimes available, but should be buried directly into the garden to avoid any offensive smell. The waste from vegetable shops should be composted and spent hops can sometimes be obtained from breweries. Gardeners should endeavour to obtain supplies of such materials to help maintain the fertility and structure of their soils.

Roses

Rose beds should be hoed to control weeds and a further mulch or layer of compost could be applied. Any winter flowering varieties could be pruned now to keep the plants shapely and encourage winter growth. Taking of cuttings, as mentioned last month, should be continued. The buds on budded stock should be checked and the ties should be cut as the buds swell. If this is not done, they may become strangled. If buds have obviously not taken, it is not too late to attempt the insertion of another bud. The old T cut should not be used, as it may have dried out, but a new cut should be made on the stem.

Scale Insects

Roses and many other ornamentals are attacked by different scale insects which suck the sap and thus debilitate the plants. Sprays of white summer oil should be used while the foliage is on the plants and winter oil can be used on dormant deciduous plants.

The hard wax scale, which is conical and star shaped while young, attacks several plants, including clematis, olearia, hebe, escallonia, matipo, and citrus. In severe infestations the trees may look unhealthy, and sooty mould usually develops on the excreta. At this time the young insects can be killed easily by spraying them with summer oil, using ½ pint to 4 gallons of water.

Identification of Plants

Gardening is more interesting when the names of plants are known. Gardeners wishing to identify plants can do this when the plants are in bloom as many are now. Most libraries contain good horticultural books which may help in identification and nurserymen will usually be willing to help. No botanist can be expected to identify plants unless at least the flower is available; it is preferable to have the whole plant.

Red Spider Mites

In dry seasons, especially, red spider mite can cause damage to many ornamental plants, including hydrangeas, carnations, roses, violets, and conifers. The plants are often stunted and appear unthrifty. Examination of the under side of the leaves will show the mites under the fine webbing.

The life of a bed of dahlias can be extended until frosts if staking, feeding, watering, and removal of spent blooms are carried out regularly.

The use of summer oil, 6½ fl. oz., plus nicotine sulphate, 4/5 fl. oz., to 4 gallons has given satisfactory control on conifers and could be used on all affected plants.

Seed Sowing

The seed of many shrubby plants can now be sown outdoors. Some of these take a considerable time to germinate, and so that they are not lost a permanent seedbed is desirable. Sowing in pots and plunging these up to their rims in soil is a satisfactory method. Seeds for sowing thus include clianthus, chimonanthus (winter sweet), spartium, laburnum, wattles, *Pittosporum tenuifolium*, kowhai, fremontia, and dodonaea.

Seed of *Asparagus sprengeri* will grow readily if sown now. Larkspurs often do best from seed sown at this time of the year.

Under Glass

Under glass seed of cyclamen, antirrhinums for planting out before winter, and *Begonia semperflorens* can be sown. All seed before sowing should be dusted by adding a pinch of lindane and thiram to the packet.

Cyclamen started into growth earlier, calceolarias, and other plants whose roots have reached the edges of small pots should be potted on into their flowering pots without delay. Rooted cuttings of such plants as balsams, fuchsias, cherry-pie, and geraniums should be potted up to make good flowering plants next summer.

Bulbs of achimenes and gloxinias which have finished flowering should be gradually ripened off by reducing the watering. Most indoor plants require less watering as transpiration decreases from now on.

General

Planting of liliums should be continued as bulbs become available. Established clumps of lilies need be divided only if a reduction of growth and flowering is evident.

Established lawns will benefit from a dressing of fertiliser applied while the dew is on the ground. The most suitable mixture is 3 parts of sulphate of ammonia and 1 part of superphosphate used at 1 oz. per square yard.

Chrysanthemums can be disbudded to encourage quality blooms. Those for flowering indoors in pots can be taken inside when showing colour.

Bulbs for flowering indoors in bowls can be planted early this month. They should be watered and placed in a cool, dark position until roots develop.

As border plants finish blooming the spent blooms should be removed or, with annuals, the whole plant should be removed and the soil lightly forked. Side dressings, adequate staking, and a supply of water will help to extend the blooming of dahlias until frosts start.

Cuttings of geraniums, calceolarias, violas, pentstemons, hydrangeas, verbenas, and many other plants can still be taken.

If a new rose bed is planned, preparation can be started. For a permanent bed digging should be deep and all available organic matter should be mixed in at this stage.

The weeding of rockeries and beds should be attended to regularly so that weed seeds do not develop and give work for years to come.

Cheese for Tea

By MAUD B. STRAIN,
Home Science Instructor,
Department of Agriculture,
Dunedin

IN New Zealand the very important part cheese can play in the diet is not always fully appreciated, as is shown by the fact that New Zealand is low on the list of cheese-eating countries. Cheese is a first-class protein food. Few people realise that there is almost twice as much first-class animal protein in cheese as there is in an equal weight of prime raw beef. More important still is the fact that it is one of the richest sources of calcium, an element which is essential for strong bones and teeth. Another virtue of cheese is that it does not need cooking and can be eaten in the state in which it is bought without the expenditure of time and energy in cooking to make it palatable and digestible.

THE League of Nations dietary recommendation is 1 oz. of cheese daily for adults and up to 3 oz. for adolescents as an alternative to meat or fish, and even for 7-year-olds 1½ oz. daily as a similar alternative. Obviously cheese is considered important, and its value is shown by the fact that the daily adult allowance of 1 oz. provides 12 per cent of the average daily requirement of protein, 37 per cent of the calcium (lime), 21 per cent of the phosphorus, and 54 per cent of the vitamin A. Primarily, it is the calcium content which makes cheese so important a food. The League of Nations recommendation of 1¾ pints of milk a day provides the whole daily requirement of calcium, but as few New Zealanders drink nearly this quantity, it is very important that they realise that cheese is the only other food commonly available which also provides an appreciable amount.

Calcium is essential for the proper formation of strong bones and teeth, and, though this is not the only factor affecting dental health, it is significant that the incidence of dental caries is very high in this country.

Digestibility

Cheese when properly eaten is not indigestible, but it should be eaten as the main part of the meal and not at the end of an already sufficient meal. It will be digested more easily if taken in a finely divided form best secured by grating, cutting, or combining with other foods. Anything that is crisp in quality, as toast, offers a pleasing contrast in texture. Cheese is a highly concentrated food; this means that it leaves no indigestible residue. To counteract the effect of this on the digestive system it should be combined with other foods containing a high proportion of indigestible bulk. Leaf and root vegetables and to some extent all fruits serve this purpose.

← Cheese custard flan with parsley garnish is an appetising tea dish.

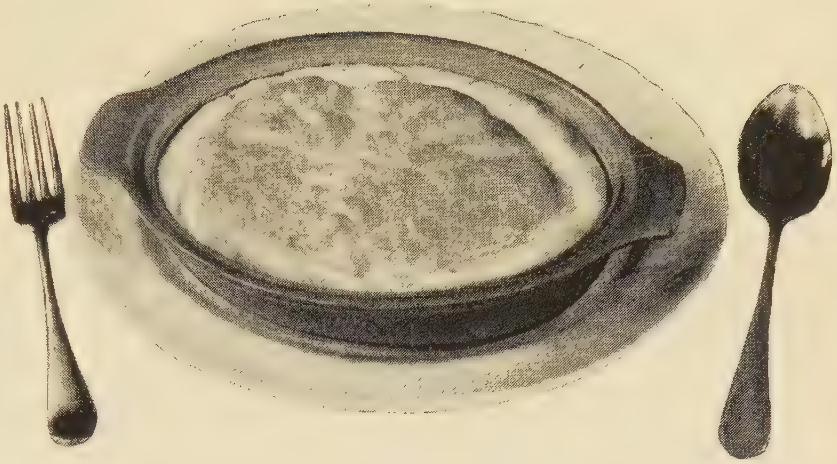
Cooking

As stated before, cheese does not need to be cooked and can be eaten in the state in which it is bought.

What other highly satisfactory meal containing some of all the nutrients the body needs can be prepared as quickly as one consisting of bread, butter, cheese, and tomato (or other fruit).

However, a large proportion of the cheese eaten is cooked in one way or another. The nutritious content is not altered by cooking, but the cheese can be made tough and not so desirable if it is overcooked. Generally it is added in a firm but finely divided form as grated cheese. As it is heated it softens and finally melts. Continued heating causes it to curdle, to become stringy, or to become hard and tough.

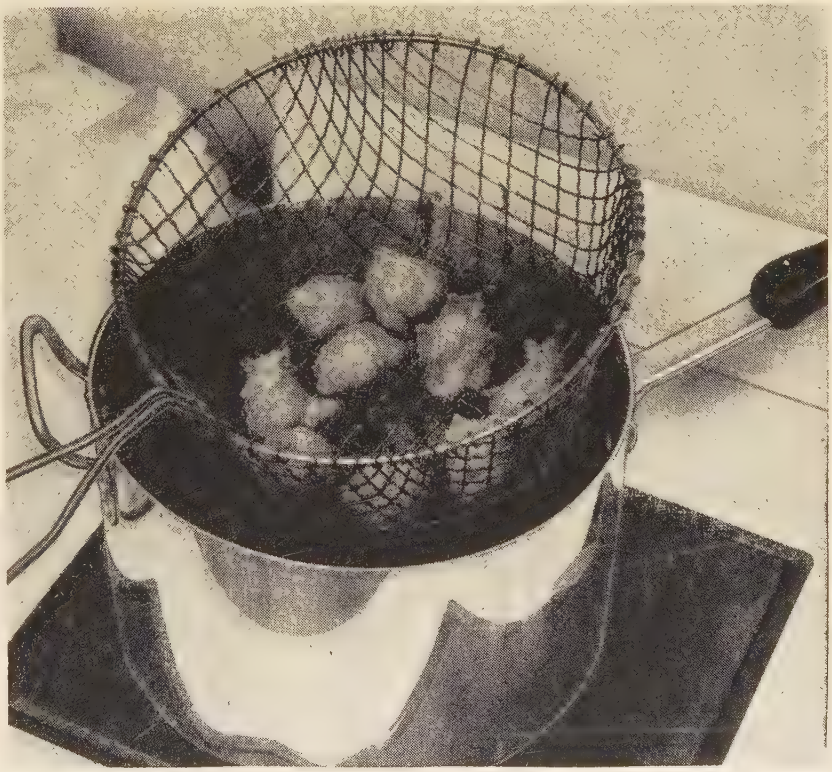
The chief aim in cooking cheese is to melt the fat so that it may blend smoothly with the other ingredients. A secondary aim, which applies to dishes topped with cheese, is to toast it to improve the flavour and appearance of the dish. Generally grated cheese is added toward the end of the cooking or to raw foods if they require nothing more than just heating through. If cheese must be added



[Oddie

Cheese fondue is easy to make, but is one of those dishes that should not be taken from the oven until the family is seated round the table.

↓ The basket in which these cheese aigrettes have been fried is rested on the side of the saucepan for a moment for the fat to drain away.



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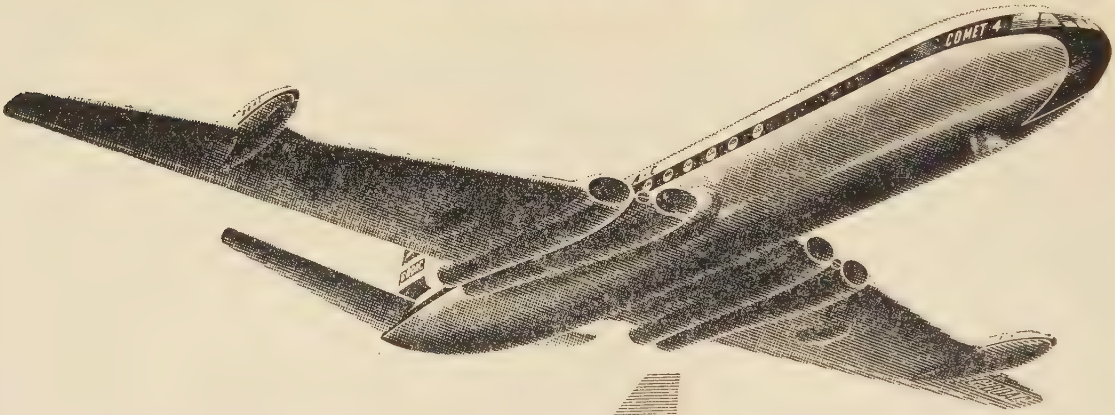

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before cooking begins, it should be protected from the heat by layers of other materials such as slices of bread or crumbs.

Varieties

The cheese available is predominantly Cheddar, usually in two or three strengths—mild, medium, and tasty—the variations being mainly the result of the length of time for which the cheese has been allowed to mature. Because longer maturing involves storage in special curing rooms with control of temperature and moisture, tasty cheese is more expensive, but because it has a much stronger flavour, less need be used.

Processed cheese has exactly the same nutritional value as natural cheese, as it is made from high-quality natural cheese. The rind is cut off and the cheese run through a grinder into a steam jacketed stainless steel cooker, flavourings are added, and the hot cheese mixture is run into lined moulds or tins to cool and set.

The making of processed cheese spreads, however, results in a product that is a little different. These spreads can be made from natural cheese with the addition of butter to give spreading consistency, and this increases the calorific value and decreases the protein content per unit weight.

Value in Slimming Diet

Cheese, in combination with salad ingredients particularly, is an excellent food for anyone who is weight conscious. The high protein value of cheese and the fact that it satisfies hunger for some considerable time makes it one of the specially recommended foods for a slimming diet. With salad ingredients added it makes a well balanced, low-calorie meal.

Recipes

In the following recipes there is no reference as to whether the cheese is mild or tasty. Which is used depends on personal choice. If a full cheese flavour is desired, tasty cheese should be used. All measurements by volume are level. The standard measuring cup (8 fl. oz.) and standard measuring spoons are used.

Cheese and Eggs

Cheese Puffy Omelet

2 eggs
Seasoning
1 tablespoon of grated cheese
2 tablespoons of milk

Cheese sauce
Grated cheese
1 tablespoon of butter (to cook)

(2 servings)

CHEESE FOR TEA

Sparrow

This casserole topped with pinwheel scones garnished with parsley is a good way of making a satisfactory meal out of left-over vegetables.

Separate the yolks from the whites of the eggs. Beat the yolks well and add the seasoning, the tablespoon of grated cheese, and milk. Whip the whites stiffly and fold them into the first mixture. Put the tablespoon of butter into the omelet pan and make it very hot. Pour in the omelet mixture and place the pan over brisk heat for 2 to 3 minutes to cook the underside a golden brown, then transfer the pan to a hot oven (400 degrees F.) for 3 to 5 minutes until the omelet is golden brown on top. Fold the omelet in half and slide it on to a hot dish, sprinkle with grated cheese, and serve hot. If liked, 2 to 3 tablespoons of hot cheese sauce can be put on one half of the omelet before it is folded over.

Cheese Fondue

3 oz. of flour
½ pint of hot milk
4 oz. of grated cheese

Few shakes of cayenne pepper
½ teaspoon of salt
3 eggs

(3 to 4 servings)

Mix the flour with a little milk and add it to the ½ pint of hot milk and cook for a few minutes. Stir in the grated cheese, cayenne pepper, and salt. Allow to cool, then add the yolks of the eggs and the whites beaten stiffly. Put into a buttered pie-dish and bake in a quick oven (400 degrees F.) for 20 minutes. Serve immediately.

Cheese Aigrettes

3 oz. of grated cheese
4 oz. of flour
2 oz. of butter
3 eggs

½ pint of boiling water
½ teaspoon of salt
Shake of cayenne pepper

(About 30 aigrettes)

Put the boiling water and butter into a saucepan over moderate heat. When the butter has melted stir in the flour all at once and keep stirring until the mixture leaves the sides of the pan. Remove the saucepan from the heat and beat in the yolks of the eggs one at a time until the mixture is smooth and shiny. Add the finely grated cheese and seasoning and fold in the stiffly whipped whites of the eggs. Leave the mixture until it is thoroughly cold. Fry in teaspoons in deep fat (380 degrees F.) for 2 to 3 minutes until golden coloured. Drain on absorbent paper and serve hot.

Cheese Custard Flan

3 oz. of grated cheese
1 egg
⅜ cup of milk
¼ teaspoon of salt

Few grains of cayenne pepper
7 in. baked pie shell

(4 servings)

Beat the egg, milk, grated cheese, and seasoning together. Pour the mixture into the baked pie shell and bake in a fairly hot oven (400 degrees F.) until the top is golden and the custard just set. Serve hot.

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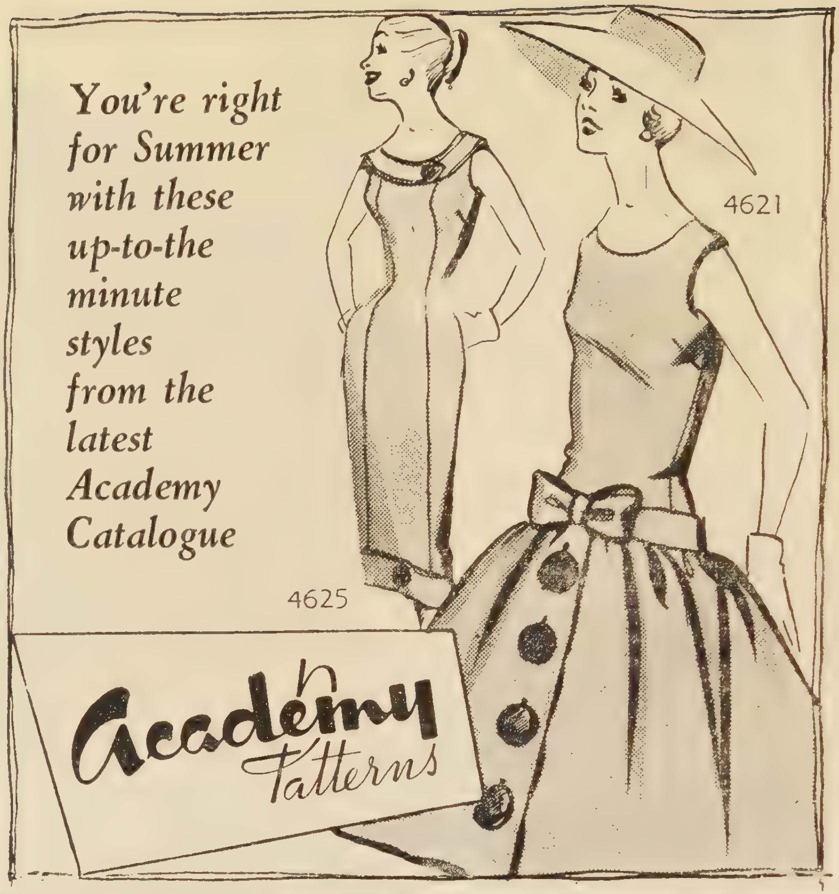

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CHEESE FOR TEA

Baked Cheese Eggs

4 oz. of finely grated cheese
4 eggs
Cayenne pepper and salt
1 teaspoon of chopped chives (optional)
4 tablespoons of cream

(4 servings)

Cover the bottom of four buttered ramekins with some of the grated cheese. Break a whole egg into each, season, sprinkle with chives, cover with cream, and top with the remainder of the grated cheese. Bake in a moderate oven (350 degrees F.) until the eggs are set but not hard (about 15 minutes) and serve immediately.

Cheese Savoury

12 slices of bread
6 slices of processed cheese
4 eggs
1 pint of milk
½ teaspoon of salt
Few shakes of pepper

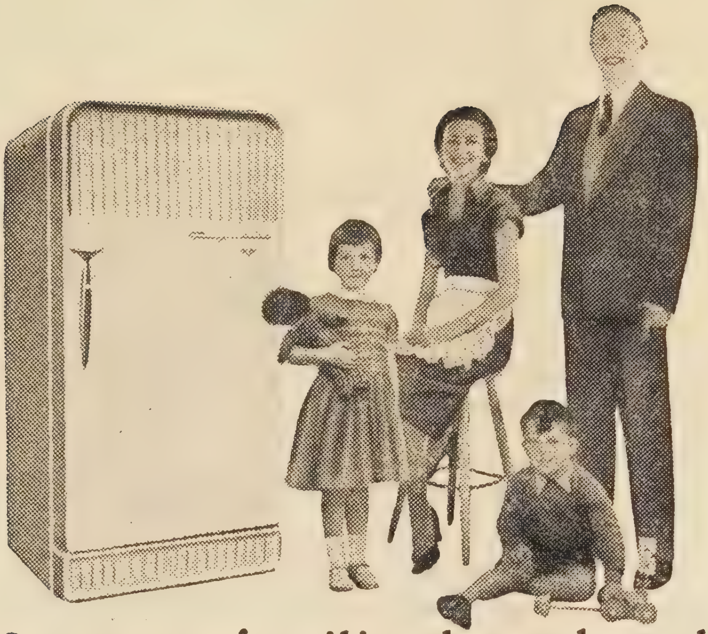
(6 servings)

Trim the crusts from the bread and arrange six slices on the bottom of a baking dish, fitting them closely together. Cover with the cheese slices and the remaining slices of bread. Beat the eggs, add the milk and seasoning, and blend well. Pour this mixture over the bread and cheese and let it stand for 1 hour. Bake about 40 minutes in a moderate oven (325 degrees F.) until puffed and lightly browned.

Cheese sandwiches surrounded with savoury custard and baked until puffed and lightly browned make a tasty tea dish.

[*Sparrow*

Triangles of toast put a finishing touch to this cheese and cabbage casserole.



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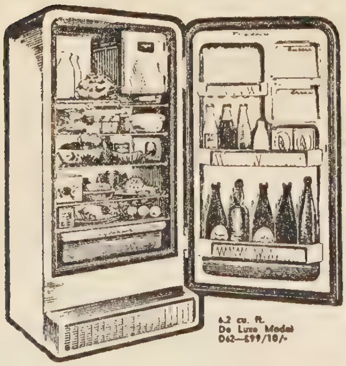

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½ teaspoon of salt
1 oz. of butter
2 tablespoons of milk
4 good-sized potatoes
Parsley

(4 servings)

Scrub the potatoes, prick them with a fork, and bake in a moderate oven for 1 to 1½ hours until they feel soft. Cut each baked potato in half, scoop out the cooked part, and mash with a fork. Add a little butter, hot milk, and seasoning. Beat well and fill one half shell of each potato. Fill the other half shell of each potato with scrambled egg mixture made as follows: beat the eggs and add the grated cheese, milk, and seasoning. Melt the butter in a small saucepan, add the egg and cheese mixture, and cook over gentle heat, stirring continuously, until lightly scrambled. Pile into potato shells or serve on slices of hot buttered toast. Garnish with sprigs of parsley.

Cheese with Vegetables

Cheese and Potato Puffs

1 lb. of cooked potatoes
Milk
Salt and pepper
4 oz. of grated cheese
2 egg yolks
Teaspoon of made mustard
3 oz. of flour
Deep fat for frying
Grated cheese for topping
Parsley

(4 servings)

Mash the potatoes with a little milk, salt, and pepper. Add the cheese, beaten yolks, mustard, and flour and combine thoroughly. Heat the fat and fry the potato mixture in dessertspoonfuls, about 5 or 6 at a time. The puffs are cooked when they rise to the surface and are golden brown all over. Sprinkle with grated cheese and garnish with parsley.

Cheese Fritters

1½ lb. of raw potatoes
2 oz. of flour
8 oz. of grated cheese
1 teaspoon of baking powder
½ teaspoon of salt

(8 to 10 fritters)

Wash and peel the potatoes and grate them finely. Mix in the flour and grated cheese. Put tablespoons of this mixture in shallow fat and fry gently, turning the fritters to brown on both sides. Lift from the fat on to kitchen paper. Serve hot with grilled tomatoes or rashers of bacon, or alternatively, serve sprinkled with a mixture of castor sugar and ground mace.

Potato, Cheese, and Tomato Casserole

4 to 6 cooked potatoes, sliced thin
12 oz. of grated cheese
8 peeled and sliced tomatoes
½ pint of milk
Pepper and salt

(4 servings)

Put alternate layers of sliced potato, grated cheese, and sliced tomatoes into the casserole, seasoning each layer, and finish with a layer of neatly arranged potato, well sprinkled with cheese. Pour the milk over this and heat through in a moderately hot oven (400 degrees F.) for 15 to 20 minutes. Finish off under the griller, if liked.

Casserole Cheese and Cabbage (good for using up cooked cabbage)

1 lb. of shredded white cabbage
1 oz. of grated cheese

Cheese Sauce (½ pint)

1 oz. of butter
1 oz. of flour
½ pint of milk
Pepper and salt
4 oz. of grated cheese

(4 servings)

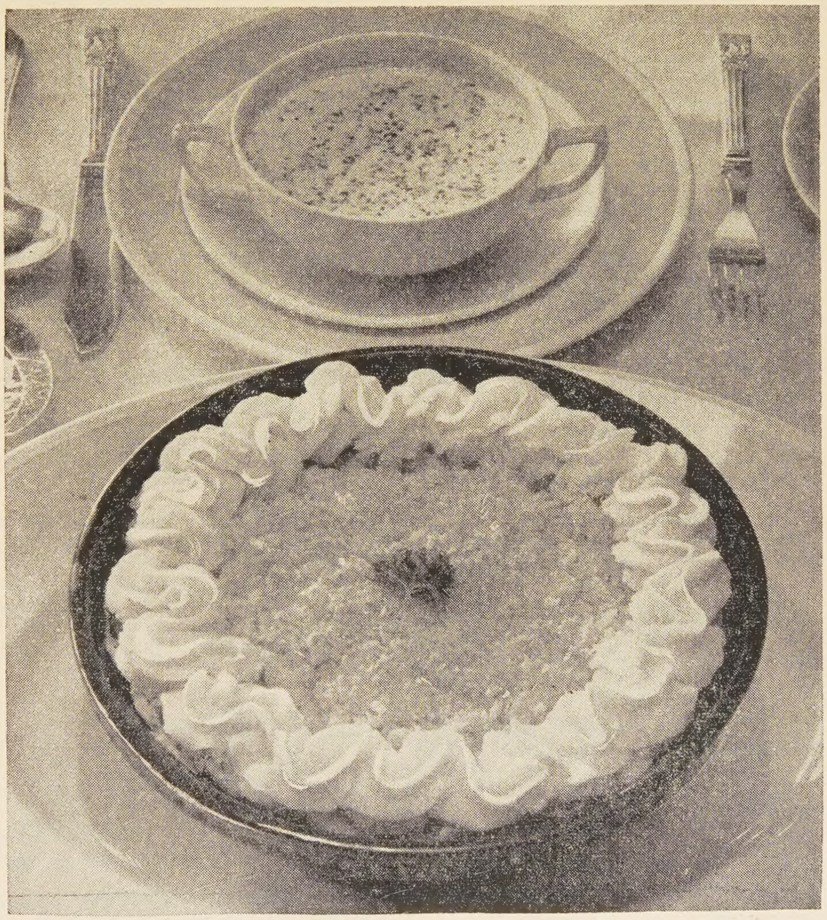
Cook the cabbage in a small amount of boiling salted water until just tender, then drain well. Make the sauce by melting the butter, stirring in the flour, and cooking for a minute. Add the milk a little at a time and blend well after each addition. Bring to the boil, stirring all the time, and cook for a minute or two. Add the 4 oz. of grated cheese and seasoning and stir until the cheese has melted. Put alternate layers of cooked cabbage and cheese sauce in a buttered casserole, sprinkle the 1 oz. of grated cheese on top, and brown lightly in a moderately hot oven or under a grill. Serve hot.

Pinwheel Vegetable Casserole

4 small cooked carrots
4 small cooked onions
¾ cup of cooked green beans
½ cup of cooked peas
Salt and pepper
1 oz. of butter
½ oz. of flour
1 cup of milk
4 oz. of grated cheese

(4 servings)

Place the vegetables, sliced, in a casserole. Make a sauce by melting the butter and adding the flour and seasoning and cooking for ½ minute. Add the milk gradually, blending it smoothly after each addition, then cook for 2 or 3 minutes. Add the grated cheese and stir until melted. Pour this sauce over the vegetables and cover with pinwheel scones made as described on page 208. Bake in a hot oven (425 degrees F.) for 15 minutes or until the scones are a light brown.



[*Sparrow*

Fish au gratin is appetising as well as being highly nourishing.

CHEESE FOR TEA . . .

Pinwheel Scones

1 cup of flour (4 oz.)
2 teaspoons of baking powder
¼ teaspoon of salt
1 oz. of butter
⅓ cup of milk
2 tablespoons of melted butter

Sift the dry ingredients together. Cut in the butter with a pastry blender or two knives until the mixture is of the consistency of breadcrumbs. Stir in the milk to make a soft dough. Turn on to a floured board, knead for a few seconds, roll out lightly to ¼ in. thickness, and brush with melted butter. Roll up like a swiss roll. Cut off 1 in. slices and place these on top of the casserole.

Leek Pie

1 lb. of leeks
6 oz. of short pastry
2 egg yolks
4 oz. of grated cheese
Pepper and salt

White Sauce (½ pint)

¾ oz. of butter
¾ oz. of flour
½ pint of milk (flavoured with onion, clove, and bay leaf)

(4 servings)

Wash the leeks well and, using the white part only, slit them lengthwise without parting completely. Cook in salted water for about 30 minutes. Line a pie plate with pastry, reserving enough pastry for a lid. Rinse the cooked leeks in cold water and drain well. Sprinkle the pastry case lightly with some of the grated cheese. Lay the leeks inside and cover with white sauce into which has been stirred the remainder of the cheese, the lightly beaten egg yolks, and seasoning. The sauce should be cold before it is put into the pie case. Cover the pie with pastry and bake in a moderately hot oven (400 degrees F.) for 30 to 40 minutes until golden brown.

Cheese and Fish

Sole Mornay

8 fillets of sole
3 oz. of grated cheese
Slices of lemon
Parsley

White Sauce (¾ pint)

1 oz. of butter
1½ cups of milk
1 oz. of flour

(4 servings)

Season the sole fillets, roll them up, and steam carefully for about 15 minutes. Make the white sauce, adding about two-thirds of the grated cheese. Put some of the sauce into the bottom of a pie-dish or casserole, then add the sole fillets. Pour the rest of the sauce over, sprinkle with the remainder of the grated cheese, and brown under a hot grill.

Cheese Kedgeree

6 oz. of grated cheese
6 oz. of cooked smoked fish
1 hard-boiled egg
8 oz. of cooked rice
¼ teaspoon of salt
Shake of cayenne pepper
Chopped parsley
Lemon quarters

(4 servings)

Flake the fish coarsely. Chop the egg white, sieve the yolk, and put on one side for garnishing. Mix the flaked fish, chopped egg white, cooked rice, and seasoning in a saucepan over moderate heat until hot, then add the grated cheese and mix in quickly with a fork. Pile the mixture into a hot entree dish, garnish with chopped parsley and sieved egg yolk, and serve at once with lemon quarters.

Fish au Gratin

2 cups of flaked (cooked) fish
1½ cups of parsley sauce
Dried breadcrumbs
1½ oz. of grated cheese
1½ lb. of freshly cooked mashed potato
Butter

(4 servings)

Mix the fish and sauce, being careful that the sauce is well seasoned. Make a border of mashed potato on a fireproof dish. Pour the fish mixture into the centre and sprinkle the cheese and breadcrumbs over the top. Dot the top with butter and brown the fish in the oven.

Salads

Cheese Stuffed Apple Salad

4 red-skinned dessert apples
4 oz. of grated cheese
2 tablespoons of chopped walnuts
Salad dressing
½ teaspoon of Worcestershire sauce
2 tablespoons of sultanas
Lettuce

(4 servings)

Wash and core the apples. Scoop them out carefully. Add the scooped-out apple to the grated cheese, chopped walnuts, and sultanas and mix lightly with the salad dressing and Worcestershire sauce. Refill the apples and arrange attractively on a bed of lettuce. Garnish with parsley.

Cheese Salad

8 oz. of cheese
2 red-skinned dessert apples
1 large orange
3 tablespoons of salad dressing
Lettuce

(4 servings)

Cut the cheese into ½ in. cubes. Wash, quarter, and core the apples and cut them into cubes. Peel and slice the orange and cut each slice into four pieces. Toss the cheese and prepared fruit together with the salad dressing. Serve individually, piled on lettuce leaves.

Prune Rarebit

2 oz. of butter
2 teaspoons of made mustard
½ teaspoon of salt
Shake of cayenne pepper
12 oz. of grated cheese
4 tablespoons of milk
4 slices of bread
8 soaked prunes, stoned and halved

(4 servings)

Beat the butter with the seasonings. Add the grated cheese and milk and mix well. Toast the bread on one side, spread the rarebit mixture evenly over the untoasted side, and brown under the grill. Garnish with the prunes and reheat under the grill.

Stuffed Pancakes

2 eggs
½ lb. of flour
½ teaspoon of salt
½ pint of milk
2 tablespoons of melted butter

Filling

1 oz. of butter
1 oz. of flour
½ teaspoon of salt
¼ pint of milk
6 oz. of grated cheese
1 egg
2 tablespoons of finely chopped sweet pickle

(6 servings)

Make the pancakes first. Sift the dry ingredients into a bowl. Beat the eggs, add the milk, and combine thoroughly. Make a well in the centre of the dry ingredients, pour in sufficient of the liquid ingredients to mix the dry ingredients to a smooth, thick paste, add the remaining liquid, and blend thoroughly. To make the filling melt the butter, stir in the flour and salt, and cook for a minute. Add the milk a little at a time and bring to the boil, stirring all the time. Add the cheese and stir until it has melted, then add the lightly beaten egg. Allow the filling to cool and mix in the pickle.

Cook the pancakes in a thick-bottomed frying pan in which a tablespoon of butter has been made hot. Pour in sufficient batter to cover thinly the bottom of the pan and cook until the top surface looks dry. Turn the pancake on to a damp cloth. Continue until the batter is all used up. Keep the pancakes rolled in the cloth until all are cooked. Put a tablespoon of the filling on to the middle of the cooked side of each pancake and roll it up. Fry the pancakes in hot melted butter, turning them to heat and brown all over.

Cheese Flory

8 oz. of puff pastry

Filling

1 oz. of butter
1 oz. of flour
½ pint of milk
Pepper and salt
8 oz. of grated cheese
2 eggs
2 tablespoons of finely chopped sweet pickle

(6 servings)

Cheese flory is suitable for a picnic tea. To make the filling melt the butter and add the flour and cook for a minute. Add the milk gradually, bring to the boil, and cook for 1 to 2 minutes. Add the grated cheese and stir the sauce until the cheese has melted. Stir in the well beaten eggs and seasoning.

Line a pie plate with puff pastry, keeping sufficient for a lid. Spread the bottom with pickle and cover with the cheese custard filling. Roll out the remaining pastry and cover the pie, making sure that the lid and under part are joined. The pastry can be marked off lightly in sections for cutting later if liked. Make a cut in the centre of the top and brush over with milk. Bake in a hot oven (425 degrees F.) until the pastry is golden (about 20 minutes). The flory can be eaten hot or cold.

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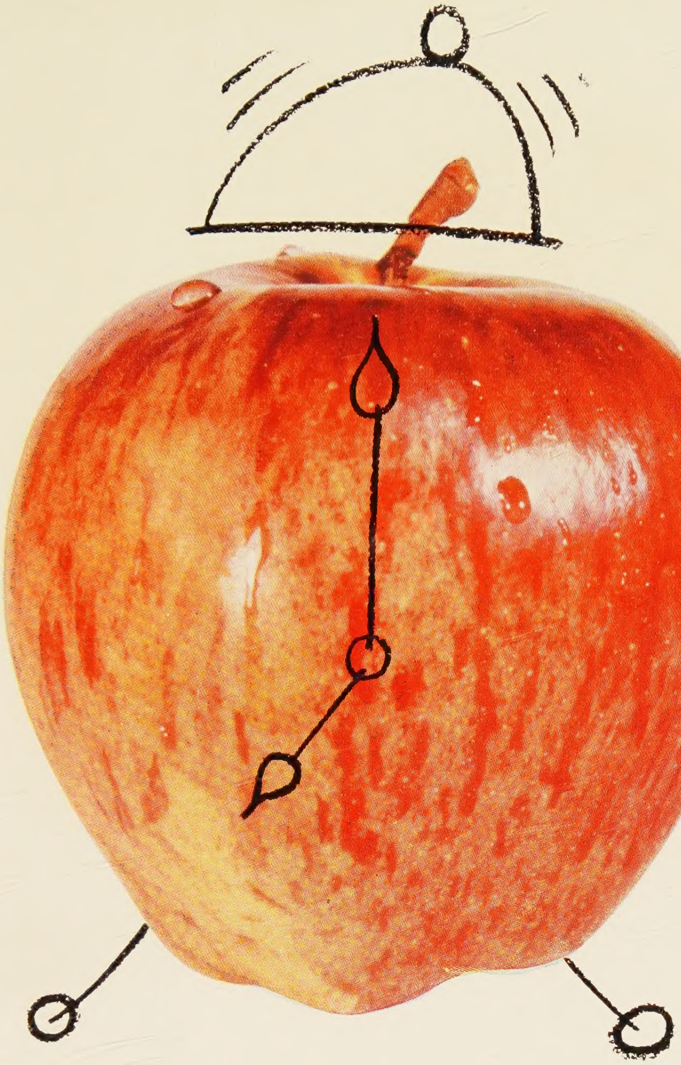

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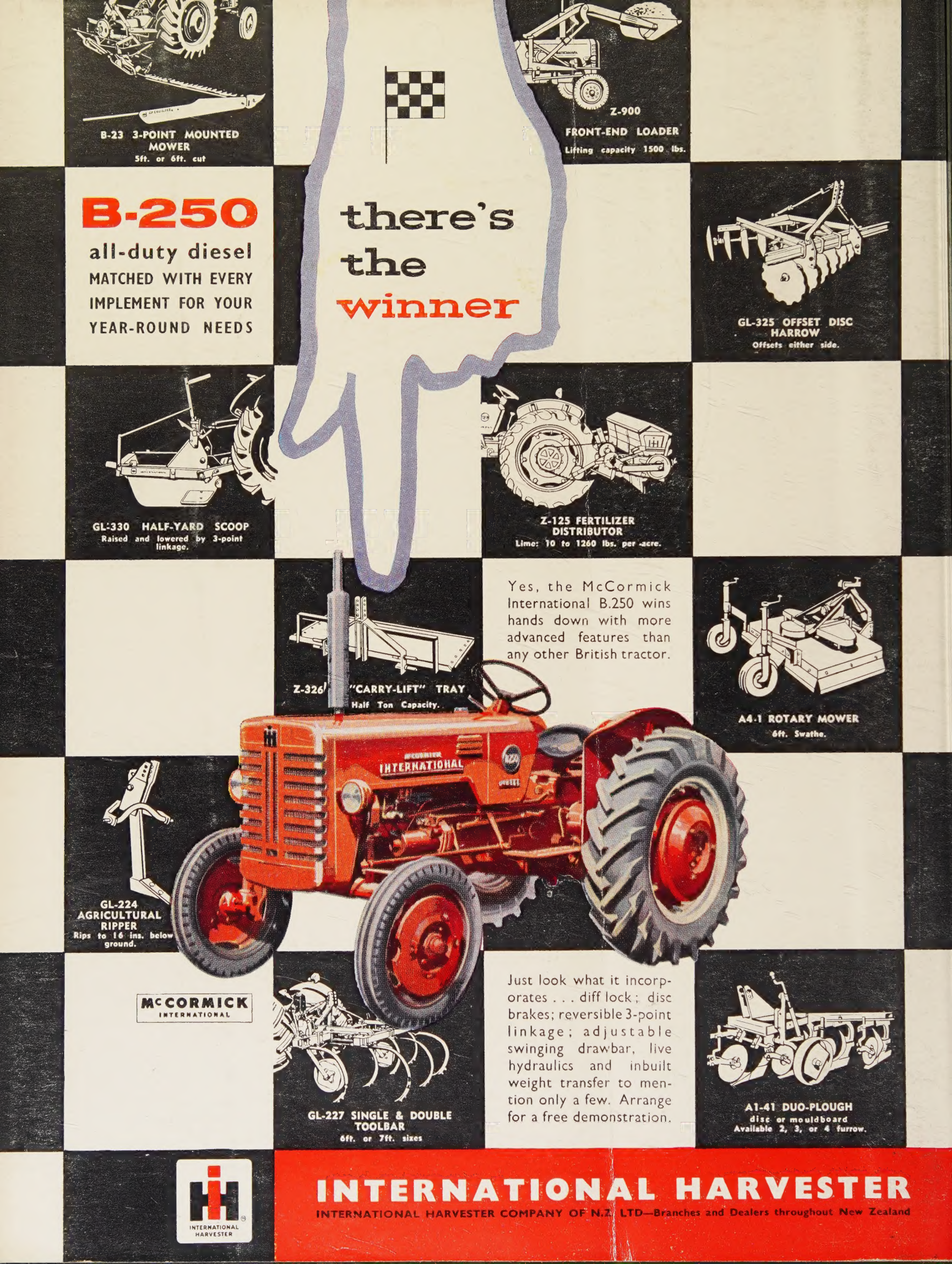

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